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Experimentally Measured Total X-Ray Attenuation Coefficients Extracted from Previously Unprocessed Documents Held by the NIST Photon and Charged Particle Data Center. II.*

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Abstract

This report is a sequel to report NISTIR 5893 (1996), and similarly lists, annotates and extracts data from the papers which have come into the NIST Photon and Charged Particle Data Center (PCPDC), or have been identified as containing data previously omitted from the data base, since the completion of that report. This report, in the same format as its predecessor, lists and annotates 23 previously unprocessed original-source documents held by the NIST Photon and Charged Particle Data Center (PCPDC), containing experimentally measured absolute values of the mass attenuation coefficient, or total photon interaction cross section for one or more elemental materials. The data from these further documents had not been previously extracted for purposes of entering into the PCPDC x-ray attenuation measurement data base. Tables of the extracted data, are included in this report, with all photon energies converted to multiples of eV (electron volts), and all photon cross sections converted to units of barns per atom. In some cases, photon wavelengths in Å (angstroms) or nm (nanometers) are given in the source documents instead of photon energies, in which case the reciprocal conversion to photon energies (in eV) was performed. Thus these additional experimental data sets are in a standard-format machine-readable form, amenable to incorporating into the NIST/PCPDC measured photon cross section data base. A total of 3357 data points, for 48 elements from B(Z=5) to U(Z=92), and for photon energies ranging from 44.9 eV to 161.92 MeV were extracted and are presented.

Key words: attenuation coefficient, cross section, data base, gamma ray, photon, x ray

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I. Introduction:

Since 1950 the National Institute of Standards and Technology (NIST; formerly National Bureau of Standards) has maintained a data base of measured and theoretical x-ray attenuation and cross section data in a hard-copy file of original source documents in the form of reprints, reports, and personal communications. This data base extends over 11 decades of photon energies, from 10 eV (extreme ultraviolet or XUV region) to 100 GeV (cosmic-ray energy region). The purpose of this data base, now residing in the NIST Photon and Charged Particle Data Center (PCPDC), is to provide photon (XUV, x-ray, gamma-ray, and bremsstrahlung) interaction data required in a variety of medical, industrial, defense, and basic-science applications. This NIST/PCPDC data base, unique in the global scientific community, has been used from time to time as the basis for the tabulation of photon cross sections and attenuation coefficients [1-15] and related quantities such as the photon energy-transfer and energy-absorption coefficients [5-7, 9, 11, 16-18].

In collaboration with H. Gerstenberg, E. Saloman and a series of summer student assistants, the data extracted from the accumulated NIST/PCPDC-held documents (1907-1986) were keyboarded into machine-readable form in 1986 [19-24]. In a further report, NISTIR 5893 (1996) [25], to which this report is a sequel, the data from additional documents (1981-1995) were extracted and put in machine-readable and standardized form. The present report is a further supplement and update to the data base, incorporating data from further previously unprocessed documents (1978-2004) accumulated in the PCPDC collection and listed and annotated (photon energy ranges, elements measured, and uncertainty estimates) in Section V.

II. Procedures:

In the above hard-copy file of original source documents, the measurements were made in a great variety of contexts and scientific disciplines, for different purposes. These purposes range from medical x-ray therapy and diagnostic applications to x-ray crystallography and aircraft radiometric fuel gauge development, and include many other extremely diverse human endeavors requiring, in common, reliable values of this x-ray interaction data. Hence the measured results in these source documents were given by the authors in units peculiar to the particular scientific discipline in which the measurements were taken.

For example, in much of the x-ray crystallography and x-ray fluorescence (XRF) analytical literature, and also in much of the atomic physics basic research literature, the photon energies are not given, but rather the photon wavelengths, in units of angstroms (Å) or nanometers (nm). The photon interaction probabilities (cross sections) are also given in a variety of different forms, such as linear attenuation coefficients (e.g., cm^{-1}), mass attenuation (or absorption) coefficients (e.g., cm^2/g or m^2/kg), cross sections (e.g., barns per atom [b/atom], or Mb per atom, or Mb per molecule for binary gases, etc.). In previous

reports in this series, in some documents the data were not given numerically, but only graphically, in which case if the author cannot be contacted (this always is attempted) for a numerical listing of the data, the numerical values were read (manually) from the published graphs. However, in the papers covered in the current report, all data were provided numerically, so reading graphs was here not necessary. In this current report, as in the previous reports in this series, all photon energies (or wavelengths) are converted to energies in units of eV, and all total-interaction cross section or attenuation coefficient data points are converted to units of barns per atom, in which 1 barn (b) = $10^{-28}m^2$.

Many of the documents also include data for compounds and mixtures of elements. However, except for mono-element binary gases such as N_2 and O_2, this report is restricted to elements only.

III. Results:

In the same format as in reference [25], the extracted photon attenuation data are given in Table 1, in terms of the total interaction cross section in b/atom as a function of photon energy in electron volts (eV). The data in Table 1 are grouped by element and arranged in ascending order of the atomic number Z. Within each group of elements, the data from each paper are arranged in ascending order of the lowest photon energy for which a data point is given. The number of data points is indicated, also the reference symbol derived from the year of publication and the first two letters of the first author's last name, with an additional number suffixed to ensure uniqueness.

The earliest photon attenuation coefficient measurements in the NBS/NIST data base are by Barkla and Sadler in 1907 with a reference symbol "07Ba01" as listed in the bibliography by Hubbell [26]. Hence, in coding the year into the reference symbols in this report, anticipating that there may be further sequels in this report series, extending beyond 2006, a third year-digit has been added to the reference symbols for papers published in 2000 or later, to distinguish between the centuries and avoid the infamous "Y2K" problems experienced at the beginning of this millennium.

Following the precedent of extracted-data tables by Saloman et al. in references [20] and [23], all photon-energy and cross-section data points are rounded off to four significant figures, and are given in scientific notation with the power of ten multiplier as a suffix.

As can be seen in the data sets in Table 1, the number data points for a given element in a given original source document varies greatly. For example, in the paper by Kurtoğlu and Tuğrul [003Ku01] a single measurement was taken at a single photon energy (80.99 keV), resulting in a single-point set for the element Au. This can be contrasted, for example, with the set of 240 data points measured for Pb as reported in the analysis by Gimm and Hubbell [78Gi01] of pair production and the photonuclear giant dipole resonance cross sections, for

photon energies 9.6 MeV to 162 MeV, in addition to many-point measurements also for Cu, Sn and Ta in that same source reference [78Gi01]. In this current report, the extreme case for density and number of data points for a single element are the 502 cross section measurements in W (Z=74) from 1.453 keV to 2.353 keV by Levine et al. [003Le01], followed closely by the 501 measurements in Si (Z=14) from 1.800 keV to 2.300 keV by Owens et al. [002Ow02].

Table 1 is summarized in Table 2, showing for each element the number of papers which contained data for that element, and the total number of data points extracted from these papers. From the 23 papers examined, for all elements, a grand total of 3357 data points were extracted.

Authors' estimates of uncertainty, if provided, are noted in the square brackets at the end of each annotated reference in the document listing in Section V. These uncertainties vary greatly, from a lower bound of $\pm 0.1\%$ in Roy et al. [97Ro01] to an upper bound of $\pm 300\%$ in Tikkanen and Huovelin [96Ti01]. In general, a more meaningful "envelope of uncertainty" is obtained by noting differences between independent measurements for the same element and energies under different experimental conditions.

IV. Text References:

1. White (Grodstein), G.R., X-Ray Attenuation Coefficients from 10 kev to 100 MeV, NBS Rep. 1003 (1952).

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3. Grodstein, G.R., X-ray Attenuation Coefficients from 10 kev to 100 MeV, NBS Circ. 583 (1957).

4. McGinnies, R.T., X-Ray Attenuation Coefficients from 10 keV to 100 MeV, Suppl. to NBS Circ. 583 (1959).

5. Berger, R.T. (McGinnies), The X- or Gamma-Ray Energy Absorption or Transfer Coefficient: Tabulations and Discussion, Radiat. Res. **15**, 1-29 (1961).

6. Hubbell, J.H. and Berger, M.J., Sec. 4.1: Attenuation Coefficients, Energy Absorption Coefficients, and Related Quantities (p. 167-184) and Sec. 4.2: Photon Atomic Cross Sections (p. 185-202). IAEA Engineering Compendium on Radiation Shielding, R.G. Jaeger, ed., Springer, Berlin (1968).

7. Hubbell, J.H., Photon Cross Sections, Attenuation Coefficients, and Energy

Absorption Coefficients from 10 keV to 100 GeV, NSRDS-NBS Rep. 29 (1969).

8. Hubbell, J.H, McMaster, W.H., Del Grande, N.K., and Mallett, J.H., Sec. 2.1: X-Ray Cross Sections and Attenuation Coefficients (p. 47-70), IUCr International Tables for X-Ray Crystallography, J.A. Ibers and W.C. Hamilton, eds., Kynoch Press, Birmingham, England (1974); based on McMaster, W.H., Del Grande, N.K., Mallett, J.H., and Hubbell, J.H., Compilation of X-Ray Cross Sections, Lawrence Livermore National Laboratory Report UCRL-50174, Sec II, Rev.1 (1969).

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10. Hubbell, J.H., Gimm, H.A. and Øverbø, I., Pair, Triplet and Total Atomic Cross Sections (and Mass Attenuation Coefficients) for 1 MeV-100 GeV Photons in Elements Z = 1 to 100, J. Phys. Chem. Ref. Data **9**, 1023-1147 (1980).

11. Hubbell, J.H., Photon Mass Attenuation and Energy-Absorption Coefficients from 1 keV to 20 MeV, Int. J. Appl. Radiat. Isot. **33**, 1269-1290 (1982).

12. Berger, M.J. and Hubbell, J.H., XCOM: Photon Cross Sections on a Personal Computer, National Bureau of Standards Internal Report NBSIR 87-3597 (1987).

13. Cullen, D.E., Chen, M.H., Hubbell, J.H., Perkins, S.T., Plechaty, E.F., Rathkopf. J.A. and Scofield, J.H., Tables and Graphs of Photon- Interaction Cross Sections from 10 eV to 100 GeV Derived from the LLNL Evaluated Photon Data Library. Part A: Z = 1 to 50. Part B: Z = 51 to 100, Lawrence Livermore National Laboratory Report UCRL=50400, Vol. 6, Rev. 4 (1989).

14. Creagh, D.C. and Hubbell, J.H., X-Ray Absorption (or Attenuation) Coefficients, Section 4.2.4 in IUCr International Tables for Crystallography, Vol. C, A.J.C. Wilson, Editor, Kluwer Academic Publishers (Dordrecht/Boston/London 1992), 189-206.

15. Berger, M.J. and Hubbell, J.H., Photon Attenuation Coefficients, in CRC Handbook of Chemistry and Physics, 76th Edition, D.R. Lide, Editor-in-Chief (CRC Press, Inc., 1995-1996), p. 10-284 to 10-288.

16. Higgins, P.D., Attix, F.H., Hubbell, J.H., Seltzer, S.M., Berger, M.J. and Sibata, C.H., Mass Energy-Transfer and Mass Energy-Absorption Coefficients, Including In-Flight Positron Annihilation for Photon Energies 1 keV to 100 MeV, National Institute of Standards and Technology Internal Report NISTIR 4812 (1992).

17. Seltzer, S.M., Calculation of Photon Energy-Transfer and Mass Energy-Absorption

Coefficients, Rad. Res. **136**, 147-170 (1993).

18. Seltzer, S.M. and Hubbell, J.H., Tables and Graphs of Photon Mass Attenuation Coefficients and Mass Energy Absorption Coefficients for Photon Energies 1 keV to 20 MeV for Elements Z = 1 to 92 and Some Dosimetric Materials, Japanese Society of Radiological Technology Report ISSN 1340-7716 (1995); see also Hubbell. J.H. and Seltzer, S.M., National Institute of Standards and Technology Report NISTIR 5632 (1995).

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26. Hubbell, J.H., Bibliography of Photon Total Cross Section (Attenuation Coefficient) Measurements 10 eV to 13.5 GeV, 1907-1993, NISTIR 5437 (1994).

V. Annotated List of Documents from which Data Were Extracted:

78Gi01 Gimm, H.A. and Hubbell, J.H., NBS Tech. Note **968** (1978)
Total Photon Absorption Cross Section Measurements, Theoretical Analysis and Evaluations for Energies above 10 MeV
(9.61 MeV to 161.92 MeV: Cu, Sn, Ta, Pb) [±0.2%]

96Bi01 Bickel, M., Nagel, W. and Quik, F., J. Radioanalyt. Nucl. Chem. **204**, 113-121 (1996)
High Precision Determination of Uranium in Ore by Gamma-Ray Spectrometry
[Numerical data given in Nagel, W. and Quik, F., CEC Report EUR 14659 (1993)]
(163.4 keV: U) [±0.48%]

96Er01 Ertugrul, M., Simsek, O., Dogan, O. and Turgut, U., J. Radioanalyt. Nucl. Chem., Lett. **213**, 37-44 (1996)
Direct Determination of Total Atomic Photoelectric and Total Atomic Scattering Cross Sections of Gd, Tb, Dy and Er at 60 keV
(59.6 keV: Gd, Tb, Dy, Er) [±6-8%]

96Ti01 Tikkanen, T. and Huovelin, J., Nucl. Instr. Meth. A **379**, 130-138 (1996)
Transmission Properties of the X-Ray Window for the SIXA Spectrometer
[Corrected numerical data received 1/15/97 by J. Hubbell from T. Tikkanen as a personal communication.]
(0.2834 keV to 1.800 keV: C, N, O, Al) [±7% to 300%]

97Ke01 Kerur, B.R., Thontadarya, S.R. and Hanumaiah, B., X-Ray Spectrom. **27**, 45-48 (1997)
Photoelectric Cross Sections: Comparison between Experimental and Renormalized and Unrenormalized Theoretical values
(6.400 keV, 8.041 keV: Al, S, Ca, V, Cr, Mn, Fe, Co, Cu, Zn, Mo, Ta) [±0.2% to 2.0%]

97Ro01 Roy, B., Chatterjee, B.K., Roy, S.C., Bhattacharya, N. and Choudhury, N., Appl. Radiat. Isot. **48**, 785-788 (1997)
Photoelectric Cross-Sections Derived from Total Attenuation Coefficient of Photons near Absorption Edges of Heavier Atoms
(43 keV, 59.5 keV: Nb, Mo, Cd, In, Gd, Dy, Er, Yb, Ta, Au, U) [±0.1% to 2.5%]

99Ka01 Karabulut, A., Budak, G. and Ertugrul, M., Nucl. Instr. Meth. B **152**, 202-206 (1999)
Fast Measurement of Total Atomic Attenuation, Total Atomic Photoelectric and Total Atomic Scattering Cross Sections in the Range $58 \leq Z \leq 69$ Using Radioisotope X-Ray Fluorescence
(59.537 keV: Ce, Pr, Nd, Eu, Gd, Tb, Dy, Ho, Er) [±3%]

001An01 Angelone, M., Bubba, T. and Esposito, A., Appl. Radiat. Isot. **55**, 505-511 (2001)
Measurement of the Mass Attenuation Coefficient for Elemental Materials in the Range $6 \leq Z \leq 82$ Using X-Rays from 13 up to 50 keV
(13.37 kev to 50.65 keV: C, Al, Ti, V, Mn, Fe, Co, Ni, Cu, Zn, Zr, Nb, Mo, Rh, Pd, Ag, Cd, In, Ta, Pt, Au, Pb) [±2.5% to 8.0%]

001Ba01 Baltazar-Rodrigues, J. and Cusatis, C., Nucl. Instr. Meth. B **179**, 325-333 (2001)
Determination of X-Ray Photoelectric Absorption of Ge and Si Avoiding Solid-State Effects
(8.048 keV to 24.945 keV: Si, Ge) [±0.1% to 0.3%]

001Ch01 Chantler, C.T., Tran, C.Q., Barnea, Z., Paterson, D., Cookson, D.J. and Balaic, D.X., Phys. Rev. A **64**, 062506, 1-15 (2001)
Measurement of the X-Ray Mass Attenuation Coefficient of Copper Using 8.85-20 keV Synchrotron Radiation
(8.8709 keV to 20.0268 keV: Cu) [0.271% to 0.332%]

002Ma01 Mallikarjuna, M.L., Gowda, S.B.A., Krishnaveni, S., Gowda, R. and Umesh, T.K., Nucl. Sci. & Eng. **140**, 96-102 (2002)
Studies on Photon Interaction around the K-Edge of Some Elements
(5.895 keV to 84.3 keV: Cu, Zr, Ag, Sn) [±3% to 4%]

002Ma02 Mallikarjuna, M/L., Gowda, S.B.A., Gowda, R. and Umesh, T.K., Radiat. Phys. Chem. **65**, 217-223 (2002)
Studies on Photon Interaction around the K-Edge of some Rare-Earth Elements
(6.4 keV to 84.3 keV: O, La, Ce, Pr, Nd, Sm, Gd, Dy, Ho, Er) [±3% to 4%]

002Ow01 Owens, A., Fraser, G.W. and Gurman, S.J., Radiat. Phys. Chem. **65**, 109-121 (2002)
Near K-Edge Linear Attenuation Coefficients for Si, SiO_2 and Si_3N_4
Note: Measurement results are presented for both crystalline ("Si-c") and amorphous ("Si-a"). For presentation in this report the crystalline-sample "Si-c" results were selected.
(1.800 keV to 2.300 keV: Si) [± % not given]

002Su01 Suzuki, I.H. and Saito, N., J. Electron Spectrosc. **123**, 239-245 (2002)
Photoabsorption Cross Section of Kr in the Sub-keV Energy region
(100 eV to 1300 eV: Kr) [±1%]

002Ta01 Tamura, M., Akimoto, T., Aoki, Y., Ikeda, J., Sato, K., Fujita, F., Homma, A., Sawamura, T. and Narita, M., Nucl. Instr. Meth. A **484**, 642-649 (2002)
Measurement of Mass Attenuation Coefficients around the K absorption Edge by Parametric X-Rays
(17.22 keV to 20.56 keV: Nb, Zr, Mo) [±1% to 15%]

003Ku01 Kurtoğlu, A. and Tuğrul, A.B., Appl. Radiat. Isot. **58**, 5-8 (2003)
Gold Analysis by the Gamma Absorption Method
(80.99 keV: Au) [±2.2%]

003Le01 Levine, Z.H., Grantham, S., Tarrio, C., Paterson, D.J., McNulty, I., Levin, T.M., Ankudinov, A.L. and Rehr, J.J., J. Res. NIST **108**, 1-10 (2003), also personal commun. to J.Hubbell with numerical data listing.
Mass Absorption Coefficient of Tungsten and Tantalum, 1450 eV to 2350 eV: Experiment, Theory and Application
(1453 eV to 2353 eV: Ta, W) [±6%]

003Su01 Suzuki, I.H. and Saito, N., J. Electron Spectrosc. **129**, 71-79 (2003)
Absolute Photoabsorption Cross-sections of Ne and Xe in the Sub-keV X-Ray Region
(44.9 eV to 1316 eV: Ne, Xe) [±1% to 2%]

003Te01 Teli, M.T., Mahajan, C.S., Malode, S.S. and Nathuram, R., Indian J. Pure & Appl. Phys. **41**, 570-574 (2003)
Measurement of Mass Attenuation Coefficients of Gamma-Rays for Various Elements through Aqueous Solution of Salts in the Energy range 0.511-1.33 MeV
(0.511 MeV to 1.33 MeV: B, Ca, V, Se, Mo, Cd, Rh, In) [± % not given]

003Tr01 Tran, C.Q., Chantler, C.T., Barnea, Z., Paterson, D. and Cookson, D.J., Phys. Rev. A **67**, 042716, 1-12 (2003)
Measurement of the X-Ray Mass Attenuation Coefficient and the Imaginary Part of the Form Factor of Silicon Using Synchrotron Radiation
(5.0146 keV to 20.0281 keV: Si) [±0.012% to 0.438%]

004Ec01 Ech-chamikh, E., Aboudihab, I., Azizan, M., Essafti, A. and Ijdiyaou, Y., Can. J. Phys. **82**, 75-79 (2004)
Détermination du coefficient d'absorption des rayons x à partir des mesures de réflectométrie X
(8.041 keV: C) [± % not given]

004Ko01 Kodre, A., Padežnik Gomilšek, J., Mihelič, A. and Arčon, I., Rad. Phys. Chem. (in press).
X-Ray Absorption in Atomic Cd in the K Edge Region
(25.782 keV to 28.529 keV: Cd) [±2%]

004Le01 Lépy, M.-C., Ferreux, L. and Plagnard, J., Appl. Rad. Isot. 60, 159-165 (2004)
A Tunable Monochromatic X-Ray Source for Metrological Studies in the 1-20 keV Energy Range: Applications to the Measurement of Attenuation Coefficients
(4.400 keV to 9.900 keV: Al, Cu) [±0.65% to 4.8%]

Table 1. Experimental Cross Section Data Extracted from Documents.

Z = 5, B eV, barns per atom pairs 5 pts ref = 003Te01

5.110+05 1.415+00 6.620+05 1.303+00 1.170+06 9.864−01 1.280+06 7.460−01
1.330+06 6.203−01

Z = 6, C eV, barns per atom pairs 65 pts ref = 96Ti01

2.834+02 4.168+04 2.836+02 4.837+04 2.838+02 6.904+04 2.840+02 1.395+05
2.842+02 3.212+05 2.844+02 6.027+05 2.846+02 8.851+05 2.848+02 1.078+06
2.850+02 1.075+06 2.852+02 8.326+05 2.854+02 6.128+05 2.856+02 4.578+05
2.858+02 4.205+05 2.860+02 4.746+05 2.862+02 5.068+05 2.864+02 4.324+05
2.866+02 3.413+05 2.868+02 3.423+05 2.870+02 4.930+05 2.875+02 9.477+05
2.880+02 6.307+05 2.885+02 6.232+05 2.890+02 7.147+05 2.895+02 7.486+05
2.900+02 7.750+05 2.905+02 8.196+05 2.910+02 9.467+05 2.915+02 1.089+06
2.920+02 1.187+06 2.925+02 1.227+06 2.930+02 1.267+06 2.935+02 1.341+06
2.940+02 1.416+06 2.945+02 1.482+06 2.950+02 1.545+06 2.955+02 1.585+06
2.960+02 1.579+06 2.965+02 1.535+06 2.970+02 1.478+06 2.975+02 1.430+06
2.980+02 1.404+06 2.985+02 1.402+06 2.990+02 1.414+06 2.995+02 1.427+06
3.000+02 1.434+06 3.050+02 1.387+06 3.100+02 9.697+05 3.150+02 8.225+05
3.200+02 7.726+05 3.250+02 7.608+05 3.300+02 7.314+05 3.350+02 6.828+05
3.400+02 6.467+05 3.450+02 6.177+05 3.500+02 5.978+05 3.550+02 5.866+05
3.600+02 5.811+05 3.650+02 5.746+05 3.700+02 5.629+05 3.750+02 5.463+05
3.800+02 5.299+05 3.850+02 5.153+05 3.900+02 5.008+05 3.950+02 4.860+05
4.000+02 4.774+05

Z = 6, C eV, barns per atom pairs 1 pt ref = 004Ec01

8.041+03 9.973+01

Z = 6, C eV, barns per atom pairs 8 pts ref = 001An01

1.337+04 2.200+01 1.744+04 1.150+01 2.210+04 7.200+00 2.499+04 6.100+00
3.206+04 5.000+00 3.665+04 4.200+00 4.423+04 4.030+00 5.065+04 3.900+00

Z = 7, N eV, barns per atom pairs 77 pts ref = 96Ti01

4.020+02 3.328+05 4.025+02 3.117+05 4.030+02 4.431+05 4.035+02 7.422+05
4.040+02 8.120+05 4.045+02 7.656+05 4.050+02 8.918+05 4.055+02 1.146+06
4.060+02 1.402+06 4.065+02 1.597+06 4.070+02 1.674+06 4.075+02 1.681+06
4.080+02 1.738+06 4.085+02 1.783+06 4.090+02 1.688+06 4.095+02 1.495+06
4.100+02 1.331+06 4.105+02 1.251+06 4.110+02 1.261+06 4.115+02 1.302+06
4.120+02 1.333+06 4.125+02 1.316+06 4.130+02 1.264+06 4.135+02 1.186+06
4.140+02 1.087+06 4.145+02 9.882+05 4.150+02 9.030+05 4.155+02 8.399+05
4.160+02 7.987+05 4.165+02 7.835+05 4.170+02 7.685+05 4.175+02 7.663+05

4.180+02 7.642+05 4.185+02 7.579+05 4.190+02 7.473+05 4.195+02 7.198+05
4.200+02 6.925+05 4.205+02 6.569+05 4.210+02 6.173+05 4.215+02 5.779+05
4.220+02 5.513+05 4.225+02 5.164+05 4.230+02 4.818+05 4.235+02 4.639+05
4.240+02 4.461+05 4.245+02 4.202+05 4.250+02 4.067+05 4.255+02 3.933+05
4.260+02 3.759+05 4.265+02 3.708+05 4.270+02 3.576+05 4.275+02 3.567+05
4.280+02 3.557+05 4.285+02 3.386+05 4.290+02 3.377+05 4.295+02 3.368+05
4.300+02 3.359+05 4.350+02 2.803+05 4.400+02 3.033+05 4.450+02 3.398+05
4.500+02 3.311+05 4.550+02 3.368+05 4.600+02 3.284+05 4.650+02 3.336+05
4.700+02 3.450+05 4.750+02 3.557+05 4.800+02 3.719+05 4.850+02 3.752+05
4.900+02 3.783+05 4.950+02 3.637+05 5.000+02 3.610+05 5.050+02 3.528+05
5.100+02 3.448+05 5.150+02 3.371+05 5.200+02 3.399+05 5.250+02 3.426+05
5.290+02 3.911+05

Z = 8, O eV, barns per atom pairs 118 pts ref = 96Ti01
5.295+02 9.196+04 5.300+02 3.452+05 5.305+02 7.259+05 5.310+02 8.201+05
5.315+02 5.372+05 5.320+02 2.664+05 5.325+02 1.690+05 5.330+02 1.717+05
5.335+02 2.224+05 5.340+02 2.774+05 5.345+02 3.247+05 5.350+02 3.607+05
5.355+02 3.985+05 5.360+02 4.470+05 5.365+02 5.118+05 5.370+02 5.799+05
5.375+02 6.623+05 5.380+02 7.588+05 5.385+02 8.603+05 5.390+02 9.559+05
5.395+02 1.035+06 5.400+02 1.086+06 5.405+02 1.088+06 5.410+02 1.046+06
5.415+02 9.844+05 5.420+02 9.269+05 5.425+02 8.857+05 5.430+02 8.535+05
5.435+02 8.286+05 5.440+02 8.125+05 5.445+02 8.001+05 5.450+02 7.843+05
5.455+02 7.649+05 5.460+02 7.422+05 5.465+02 7.231+05 5.470+02 7.023+05
5.475+02 6.920+05 5.480+02 6.835+05 5.485+02 6.785+05 5.490+02 6.735+05
5.495+02 6.720+05 5.500+02 6.671+05 5.505+02 6.622+05 5.510+02 6.573+05
5.515+02 6.524+05 5.520+02 6.475+05 5.525+02 6.393+05 5.530+02 6.345+05
5.535+02 6.263+05 5.540+02 6.215+05 5.545+02 6.151+05 5.550+02 6.120+05
5.555+02 6.040+05 5.560+02 6.010+05 5.565+02 5.946+05 5.570+02 5.933+05
5.575+02 5.920+05 5.580+02 5.874+05 5.585+02 5.861+05 5.590+02 5.864+05
5.595+02 5.835+05 5.600+02 5.789+05 5.605+02 5.777+05 5.610+02 5.764+05
5.615+02 5.751+05 5.620+02 5.706+05 5.625+02 5.661+05 5.630+02 5.649+05
5.635+02 5.604+05 5.640+02 5.560+05 5.645+02 5.516+05 5.650+02 5.471+05
5.655+02 5.460+05 5.660+02 5.416+05 5.665+02 5.388+05 5.670+02 5.361+05
5.675+02 5.349+05 5.680+02 5.306+05 5.685+02 5.326+05 5.690+02 5.299+05
5.695+02 5.272+05 5.700+02 5.261+05 5.750+02 5.119+05 5.800+02 4.982+05
5.850+02 4.881+05 5.900+02 4.782+05 5.950+02 4.629+05 6.000+02 4.481+05
6.050+02 4.366+05 6.100+02 4.280+05 6.150+02 4.223+05 6.200+02 4.116+05
6.250+02 4.037+05 6.300+02 3.959+05 6.350+02 3.906+05 6.400+02 3.854+05
6.450+02 3.756+05 6.500+02 3.681+05 6.550+02 3.608+05 6.600+02 3.493+05
6.650+02 3.448+05 6.700+02 3.383+05 6.750+02 3.319+05 6.800+02 3.259+05
6.850+02 3.165+05 6.900+02 3.210+05 6.950+02 3.196+05 7.000+02 2.990+05
7.050+02 2.846+05 7.100+02 2.817+05 7.150+02 2.752+05 7.200+02 2.705+05
7.250+02 2.658+05 7.300+02 2.613+05 7.350+02 2.568+05 7.400+02 2.525+05
7.450+02 2.483+05 7.500+02 2.442+05

Z = 8, O eV, barns per atom pairs 13 pts ref = 002Ma02

6.400+03 6.036+02 8.041+03 3.303+02 1.053+04 1.355+02 1.440+04 5.424+01
2.414+04 1.504+01 3.080+04 9.630+00 3.500+04 8.010+00 5.201+04 5.560+00
6.430+04 4.890+00 7.083+04 4.670+00 7.287+04 4.630+00 8.100+04 4.430+00
8.430+04 4,380+00

Z = 10, Ne eV, barns per atom pairs 103 pts ref = 003Su01

4.490+01 7.730+06 4.990+01 7.920+06 5.490+01 7.530+06 5.990+01 6.810+06
6.990+01 6.120+06 7.980+01 5.200+06 8.600+01 4.910+06 9.000+01 4.560+96
9.500+01 4.230+06 1.000+02 3.940+06 1.050+02 3.650+06 1.100+02 3.380+06
1.150+02 3.140+06 1.200+02 2.920+06 1.250+02 2.710+06 1.300+02 2.510+06
1.350+02 2.330+06 1.400+02 2.180+06 1.450+02 2.040+06 1.500+02 1.910+06
1.550+02 1.780+06 1.600+02 1.660+06 1.650+02 1.550+06 1.700+02 1.450+06
1.750+02 1.350+06 1.800+02 1.270+06 1.900+02 1.130+06 2.000+02 1.000+06
2.100+02 9.030+05 2.200+02 8.160+05 2.300+02 7.310+05 2.400+02 6.500+05
2.500+02 5.840+05 2.600+02 5.300+05 2.700+02 4.840+05 2.800+02 4.420+05
2.900+02 4.010+05 3.000+02 3.700+05 3.100+02 3.400+05 3.200+02 3.120+05
3.300+02 2.870+05 3.400+02 2.670+05 3.500+02 2.490+05 3.600+02 2.340+05
3.700+02 2.180+05 3.800+02 2.040+05 3.900+02 1.910+05 4.000+02 1.790+05
4.200+02 1.570+05 4.400+02 1.390+05 4.600+02 1.230+05 4.800+02 1.100+05
5.000+02 9.800+04 5.200+02 8.870+04 5.400+02 8.010+04 5.600+02 7.250+04
5.800+02 6.600+04 6.000+02 6.070+04 6.200+02 5.610+04 6.400+02 5.160+04
6.500+02 4.950+04 6.600+02 4.740+04 6.800+02 4.340+04 7.000+02 3.980+04
7.200+02 3.650+04 7.400+02 3.410+04 7.500+02 3.310+04 7.600+02 3.230+04
7.800+02 3.040+04 8.000+02 2.850+04 8.200+02 2.670+04 8.400+02 2.560+04
8.479+02 2:330+04 8.588+02 2.280+04 8.700+02 3.760+05 8.750+02 3.670+05
8.800+02 3.550+05 8.850+02 3.450+05 8.900+02 3.370+05 8.925+02 3.330+05
8.950+02 3.300+05 8.975+02 3.290+05 9.000+02 3.290+05 9.025+02 3.300+05
9.050+02 3.310+05 9.075+02 3.310+05 9.100+02 3.290+05 9.150+02 3.260+05
9.200+02 3.220+05 9.300+02 3.130+05 9.400+02 3.050+05 9.500+02 2.970+05
9.600+02 2.890+05 9.800+02 2.710+05 1.000+03 2.560+05 1.050+03 2.260+05
1.100+03 2.020+05 1.150+03 1.820+05 1.200+03 1.600+05 1.240+03 1.460+05
1.265+03 1.360+05 1.290+03 1.270+05 1.316+03 1.260+05

Z = 13, Al eV, barns per atom pairs 291 pts ref = 96Ti01

6.000+01 1.022+06 6.100+01 5.173+05 6.200+01 5.719+05 6.300+01 6.193+05
6.400+01 6.550+05 6.500+01 6.345+05 6.600+01 5.223+05 6.700+01 5.229+05
6.800+01 5.420+05 6.900+01 5.309+05 7.000+01 5.358+05 7.100+01 5.585+05
7.150+01 5.610+05 7.160+01 5.608+05 7.170+01 5.598+05 7.180+01 5.617+05
7.190+01 5.612+05 7.200+01 5.614+05 7.210+01 5.630+05 7.220+01 5.653+05
7.230+01 5.689+05 7.240+01 5.758+05 7.250+01 5.923+05 7.260+01 6.828+05
7.270+01 1.287+06 7.280+01 1.763+06 7.290+01 1.720+06 7.300+01 1.682+06
7.310+01 1.878+06 7.320+01 2.136+06 7.330+01 2.125+06 7.340+01 2.087+06
7.350+01 2.061+06 7.360+01 2.042+06 7.370+01 2.031+06 7.380+01 2.029+06

7.390+01 2.035+06 7.400+01 2.039+06 7.410+01 2.041+06 7.420+01 2.045+06
7.430+01 2.052+06 7.440+01 2.055+06 7.450+01 2.059+06 7.460+01 2.060+06
7.470+01 2.060+06 7.480+01 2.060+06 7.490+01 2.061+06 7.500+01 2.061+06
7.550+01 2.056+06 7.600+01 2.058+06 7.650+01 2.107+06 7.700+01 2.227+06
7.750+01 2.254+06 7.800+01 2.233+06 7.850+01 2.272+06 7.900+01 2.333+06
7.950+01 2.425+06 8.000+01 2.513+06 8.050+01 2.572+06 8.100+01 2.624+06
8.150+01 2.699+06 8.200+01 2.798+06 8.250+01 2.906+06 8.300+01 3.002+06
8.350+01 3.086+06 8.400+01 3.158+06 8.450+01 3.210+06 8.500+01 3.260+06
8.550+01 3.299+06 8.600+01 3.337+06 8.650+01 3.388+06 8.700+01 3.458+06
8.750+01 3.544+06 8.800+01 3.633+06 8.850+01 3.743+06 8.900+01 3.857+06
8.950+01 3.983+06 9.000+01 4.105+06 9.100+01 4.348+06 9.200+01 4.604+06
9.300+01 4.877+06 9.400+01 5.143+06 9.500+01 5.417+06 9.600+01 5.597+06
9.700+01 5.691+06 9.800+01 5.633+06 9.900+01 5.374+06 1.000+02 4.773+06
1.010+02 4.337+06 1.020+02 4.032+06 1.030+02 3.864+06 1.040+02 3.820+06
1.050+02 3.861+06 1.060+02 3.958+06 1.070+02 4.089+06 1.080+02 4.230+06
1.090+02 4.357+06 1.100+02 4.462+06 1.110+02 4.545+06 1.120+02 4.610+06
1.130+02 4.658+06 1.140+02 4.686+06 1.150+02 4.700+06 1.160+02 4.709+06
1.170+02 4.728+06 1.180+02 4.838+06 1.190+02 4.814+06 1.200+02 4.798+06
1.210+02 4.824+06 1.220+02 4.879+06 1.230+02 4.943+06 1.240+02 4.970+06
1.250+02 4.956+06 1.260+02 4.924+06 1.270+02 4.867+06 1.280+02 4.781+06
1.290+02 4.662+06 1.300+02 4.510+06 1.310+02 4.340+06 1.320+02 4.180+06
1.330+02 4.038+06 1.340+02 3.929+06 1.350+02 3.859+06 1.360+02 3.816+06
1.370+02 3.788+06 1.380+02 3.768+06 1.390+02 3.750+06 1.400+02 3.727+06
1.410+02 3.704+06 1.420+02 3.698+06 1.430+02 3.671+06 1.440+02 3.643+06
1.450+02 3.617+06 1.460+02 3.596+06 1.470+02 3.581+06 1.480+02 3.575+06
1.490+02 3.577+06 1.500+02 3.586+06 1.520+02 3.625+06 1.540+02 3.647+06
1.560+02 3.642+06 1.580+02 3.624+06 1.600+02 3.598+06 1.620+02 3.554+06
1.640+02 3.491+06 1.660+02 3.417+06 1.680+02 3.323+06 1.700+02 3.197+06
1.720+02 3.060+06 1.740+02 2.934+06 1.760+02 2.838+06 1.780+02 2.774+06
1.800+02 2.733+06 1.820+02 2.701+06 1.840+02 2.670+06 1.860+02 2.644+06
1.880+02 2.616+06 1.900+02 2.588+06 1.920+02 2.562+06 1.940+02 2.542+06
1.960+02 2.524+06 1.980+02 2.506+06 2.000+02 2.489+06 2.020+02 2.485+06
2.040+02 2.480+06 2.060+02 2.456+06 2.080+02 2.426+06 2.100+02 2.396+06
2.120+02 2.356+06 2.140+02 2.308+06 2.160+02 2.250+06 2.180+02 2.182+06
2.200+02 2.114+06 2.220+02 2.054+06 2.240+02 2.010+06 2.260+02 1.978+06
2.280+02 1.952+06 2.300+02 1.926+06 2.320+02 1.895+06 2.340+02 1.864+06
2.360+02 1.835+06 2.380+02 1.807+06 2.400+02 1.781+06 2.420+02 1.755+06
2.440+02 1.728+06 2.460+02 1.700+06 2.480+02 1.672+06 2.500+02 1.655+06
2.520+02 1.642+06 2.540+02 1.619+06 2.560+02 1.600+06 2.580+02 1.578+06
2.600+02 1.556+06 2.620+02 1.534+06 2.640+02 1.509+06 2.660+02 1.489+06
2.680+02 1.468+06 2.700+02 1.448+06 2.720+02 1.427+06 2.740+02 1.405+06
2.760+02 1.382+06 2.780+02 1.359+06 2.790+02 1.347+06 2.792+02 1.345+06
2.794+02 1.342+06 2.796+02 1.340+06 2.798+02 1.340+06 2.800+02 1.339+06
2.802+02 1.335+06 2.804+02 1.335+06 2.806+02 1.334+06 2.808+02 1.333+06

2.810+02 1.330+06 2.812+02 1.328+06 2.814+02 1.328+06 2.816+02 1.326+06
2.818+02 1.325+06 2.820+02 1.327+06 2.822+02 1.327+06 2.824+02 1.328+06
2.826+02 1.330+06 2.828+02 1.333+06 2.830+02 1.338+06 2.832+02 1.350+06
1.554+03 1.905+04 1.555+03 2.424+04 1.556+03 3.662+04 1.557+03 6.007+04
1.558+03 8.841+04 1.559+03 1.243+05 1.560+03 1.604+05 1.561+03 1.904+05
1.562+03 2.110+05 1.563+03 2.246+05 1.564+03 2.339+05 1.565+03 2.383+05
1.566+03 2.367+05 1.567+03 2.341+05 1.568+03 2.333+05 1.569+03 2.312+05
1.570+03 2.320+05 1.571+03 2.300+05 1.572+03 2.261+05 1.573+03 2.202+05
1.574+03 2.107+05 1.575+03 2.046+05 1.576+03 1.980+05 1.577+03 1.933+05
1.578+03 1.829+05 1.579+03 1.780+05 1.580+03 1.707+05 1.581+03 1.657+05
1.582+03 1.600+05 1.583+03 1.549+05 1.584+03 1.512+05 1.585+03 1.467+05
1.586+03 1.449+05 1.587+03 1.470+05 1.588+03 1.527+05 1.589+03 1.558+05
1.590+03 1.662+05 1.591+03 1.739+05 1.592+03 1.803+05 1.593+03 1.840+05
1.594+03 1.866+05 1.595+03 1.889+05 1.596+03 1.876+05 1.597+03 1.852+05
1.598+03 1.843+05 1.599+03 1.827+05 1.600+03 1.803+05 1.610+03 1.701+05
1.620+03 1.474+05 1.630+03 1.609+05 1.640+03 1.636+05 1.650+03 1.608+05
1.660+03 1.482+05 1.670+03 1.479+05 1.680+03 1.494+05 1.690+03 1.509+05
1.700+03 1.504+05 1.710+03 1.436+05 1.720+03 1.391+05 1.730+03 1.367+05
1.740+03 1.349+05 1.750+03 1.347+05 1.760+03 1.316+05 1.770+03 1.284+05
1.780+03 1.267+05 1.790+03 1.248+05 1.800+03 1.232+05

Z = 13, Al eV, barns per atom pairs 31 pts ref = 004Le01
4.000+03 1.631+04 4.200+03 1.417+04 4.400+03 1.243+04 4.600+03 1.106+04
4.800+03 9.810+03 5.000+03 8.728+03 5.200+03 7.728+03 5.400+03 6.879+03
5.600+03 6.358+03 5.800+03 5.646+03 6.000+03 5.148+03 6.200+03 4.747+03
6.400+03 4.276+03 6.600+03 3.924+03 6.800+03 3.596+03 7.000+03 3.341+03
7.200+03 3.030+03 7.400+03 2.710+03 7.600+03 2.583+03 7.800+03 3.347+03
8.000+03 2.204+03 8.200+03 2.017+03 8.400+03 1.935+03 8.600+03 1.807+03
8.800+03 1.677+03 9.000+03 1.582+03 9.100+03 1.491+03 9.300+03 1.391+03
9.500+03 1.299+03 9.700+03 1.231+03 9.900+03 1.166+03

Z = 13, Al eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 4.310+03 8.041+03 2.263+03

Z = 13, Al eV, barns per atom pairs 10 pts ref = 001An01
1.337+04 4.400+02 1.497+04 3.180+02 1.744+04 2.300+02 1.963+04 1.540+02
2.210+04 1.120+02 2.499+04 7.800+01 3.206+04 4.100+01 3.665+04 3.000+01
4.423+04 2.070+01 5.065+04 1.630+01

Z = 14, Si eV, barns per atom pairs 501 pts ref = 002Ow01
1.800+03 1.414+04 1.801+03 1.410+04 1.802+03 1.405+04 1.803+03 1.401+04
1.804+03 1.397+04 1.805+03 1.393+04 1.806+03 1.389+04 1.807+03 1.385+04
1.808+03 1.381+04 1.809+03 1.380+04 1.810+03 1.378+04 1.811+03 1.377+04
1.812+03 1.376+04 1.813+03 1.374+04 1.814+03 1.371+04 1.815+03 1.369+04

1.816+03 1.366+04 1.817+03 1.364+04 1.818+03 1.361+04 1.819+03 1.360+04
1.820+03 1.360+04 1.821+03 1.359+04 1.822+03 1.356+04 1.823+03 1.357+04
1.824+03 1.360+04 1.825+03 1.363+04 1.826+03 1.366+04 1.827+03 1.369+04
1.828+03 1.373+04 1.829+03 1.380+04 1.830+03 1.388+04 1.831+03 1.403+04
1.832+03 1.426+04 1.833+03 1.459+04 1.834+03 1.508+04 1.835+03 1.591+04
1.836+03 1.758+04 1.837+03 2.219+04 1.838+03 4.786+04 1.839+03 1.527+05
1.840+03 2.540+05 1.841+03 2.617+05 1.842+03 2.186+05 1.843+03 2.009+05
1.844+03 1.964+05 1.845+03 2.009+05 1.846+03 2.118+05 1.847+03 2.183+05
1.848+03 2.039+05 1,849+03 1.993+05 1.850+03 2.026+05 1.851+03 2.028+05
1.852+03 1.941+05 1.853+03 1.811+05 1.854+03 1.739+05 1.855+03 1.727+05
1.856+03 1.713+05 1.857+03 1.691+05 1.858+03 1.670+05 1.859+03 1.648+05
1.860+03 1.634+05 1.861+03 1.617+05 1.862+03 1.610+05 1.863+03 1.625+05
1.864+03 1.643+05 1.865+03 1.644+05 1.866+03 1.641+05 1.867+03 1.608+05
1.868+03 1.572+05 1.869+03 1.520+05 1.870+03 1.468+05 1.871+03 1.419+05
1.872+03 1.373+05 1.873+03 1.358+05 1.874+03 1.345+05 1.875+03 1.353+05
1.876+03 1.360+05 1.877+03 1.369+05 1.878+03 1.377+05 1.879+03 1.383+05
1.880+03 1.391+05 1.881+03 1.412+05 1.882+03 1.431+05 1.883+03 1.436+05
1.884+03 1.440+05 1.885+03 1.430+05 1.886+03 1.416+05 1.887+03 1.399+05
1.888+03 1.381+05 1.889+03 1.367+05 1.890+03 1.358+05 1.891+03 1.373+05
1.892+03 1.391+05 1.893+03 1.431+05 1.894+03 1.469+05 1.895+03 1.496+05
1.896+03 1.522+05 1.897+03 1.537+05 1.898+03 1.551+05 1.899+03 1.560+05
1.900+03 1.567+05 1.901+03 1.562+05 1.902+03 1.554+05 1.903+03 1.536+05
1.904+03 1.516+05 1.905+03 1.496+05 1.906+03 1.475+05 1.907+03 1.451+05
1.908+03 1.428+05 1.909+03 1.398+05 1.910+03 1.369+05 1.911+03 1.340+05
1.912+03 1.311+05 1.913+03 1.291+05 1.914+03 1.272+05 1.915+03 1.267+05
1.916+03 1.263+05 1.917+03 1.270+05 1.918+03 1.276+05 1.919+03 1.281+05
1.920+03 1.287+05 1.921+03 1.285+05 1.922+03 1.283+05 1.923+03 1.281+05
1.924+03 1.278+05 1.925+03 1.278+05 1.926+03 1.279+05 1.927+03 1.284+05
1.928+03 1.288+05 1.929+03 1.295+05 1.930+03 1.302+05 1.931+03 1.305+05
1.932+03 1.308+05 1.933+03 1.307+05 1.934+03 1.306+05 1.935+03 1.301+05
1.936+03 1.297+05 1.937+03 1.294+05 1.938+03 1.291+05 1.939+03 1.289+05
1.940+03 1.287+05 1.941+03 1.286+05 1.942+03 1.285+05 1.943+03 1.285+05
1.044+03 1.284+05 1.945+03 1.284+05 1.946+03 1.284+05 1.947+03 1.281+05
1.948+03 1.279+05 1.949+03 1.277+05 1.950+03 1.276+05 1.951+03 1.277+05
1.952+03 1.279+05 1.953+03 1.283+05 1.954+03 1.287+05 1.955+03 1.291+05
1.956+03 1.294+05 1.957+03 1.298+05 1.958+03 1.301+05 1.959+03 1.305+05
1.960+03 1.309+05 1.961+03 1.313+05 1.961+03 1.318+05 1.963+03 1.323+05
1.964+03 1.327+05 1.965+03 1.329+05 1.966+03 1.330+05 1.967+03 1.326+05
1.968+03 1.322+05 1.969+03 1.313+05 1.970+03 1.304+05 1.971+03 1.294+05
1.972+03 1.285+05 1.972+03 1.276+05 1.974+03 1.269+05 1.975+03 1.263+05
1.976+03 1.258+05 1.977+03 1.253+05 1.978+03 1.248+05 1.979+03 1.241+05
1.980+03 1.234+05 1.981+03 1.226+05 1.982+03 1.219+05 1.983+03 1.212+05
1.984+03 1.205+05 1.985+03 1.202+05 1.986+03 1.199+05 1.987+03 1.199+05
1.988+03 1.199+05 1.989+03 1.199+05 1.990+03 1.199+05 1.991+03 1.197+05

1.992+03 1.196+05 1.993+03 1.195+05 1.994+03 1.194+05 1.995+03 1.193+05
1.996+03 1.191+05 1.997+03 1.190+05 1.998+03 1.188+05 1.999+03 1.187+05
2.000+03 1.186+05 2.001+03 1.185+05 2.002+03 1.184+05 2.003+03 1.183+05
2.004+03 1.184+05 2.005+03 1.184+05 2.006+03 1.184+05 2.007+03 1.184+05
2.008+03 1.185+05 2.009+03 1.187+05 2.010+03 1.184+05 2.011+03 1.191+05
2.012+03 1.193+05 2.013+03 1.194+05 2.014+03 1.195+05 2.015+03 1.195+05
2.016+03 1.196+05 2.017+03 1.196+05 2.018+03 1.197+05 2.019+03 1.197+05
2.020+03 1.197+05 2.021+03 1.197+05 2.022+03 1.197+05 2.023+03 1.198+05
2.024+03 1.197+05 2.025+03 1.197+05 2.026+03 1.197+05 2.027+03 1.197+05
2.028+03 1.197+05 2.029+03 1.194+05 2.030+03 1.190+05 2.031+03 1.187+05
2.032+03 1.184+05 2.033+03 1.181+05 2.034+03 1.182+05 2.035+03 1.183+05
2.036+03 1.184+05 2.037+03 1.186+05 2.038+03 1.187+05 2.039+03 1.185+05
2.040+03 1.184+05 2.041+03 1.183+05 2.042+03 1.182+05 2.043+03 1.181+05
2.044+03 1.177+05 2.045+03 1.173+05 2.046+03 1.170+05 2.047+03 1.166+05
2.048+03 1.163+05 2.049+03 1.160+05 2.050+03 1.157+05 2.051+03 1.153+05
2.052+03 1.150+05 2.053+03 1.148+05 2.054+03 1.146+05 2.055+03 1.145+05
2.056+03 1.144+05 2.057+03 1.143+05 2.058+03 1.142+05 2.059+03 1.142+05
2.060+03 1.142+05 2.061+03 1.141+05 2.062+03 1.141+05 2.063+03 1.141+05
2.064+03 1.138+05 2.065+03 1.136+05 2.066+03 1.133+05 2.067+03 1.131+05
2.068+03 1.129+05 2.069+03 1.127+05 2.070+03 1.124+05 2.071+03 1.122+05
2.072+03 1.120+05 2.073+03 1.118+05 2.074+03 1.115+05 2.075+03 1.113+05
2.076+03 1.111+05 2.077+03 1.109+05 2.078+03 1.107+05 2.079+03 1.105+05
2.080+03 1.103+05 2.081+03 1.101+05 2.082+03 1.099+05 2.083+03 1.097+05
2.084+03 1.096+05 2.085+03 1.095+05 2.086+03 1.094+05 2.087+03 1.093+05
2.088+03 1.092+05 2.089+03 1.092+05 2.090+03 1.091+05 2.091+03 1.090+05
2.092+03 1.089+05 2.093+03 1.088+05 2.094+03 1.088+05 2.095+03 1.087+05
2.096+03 1.080+05 2.097+03 1.085+05 2.098+03 1.089+05 2.099+03 1.083+05
2.100+03 1.081+05 2.101+03 1.080+05 2.102+03 1.079+05 2.103+03 1.078+05
2.104+03 1.078+05 2.105+03 1.079+05 2.106+03 1.079+05 2.107+03 1.079+05
2.108+03 1.079+05 2.109+03 1.079+05 2.110+03 1.079+05 2.111+03 1.079+05
2.112+03 1.079+05 2.113+03 1.079+05 2.114+03 1.079+05 2.115+03 1.079+05
2.116+03 1.079+05 2.117+03 1.078+05 2.118+03 1.078+05 2.119+03 1.078+05
2.120+03 1.078+05 2.121+03 1.077+05 2.122+03 1.077+05 2.123+03 1.077+05
2.124+03 1.076+05 2.125+03 1.076+05 2.126+03 1.075+05 2.127+03 1.075+05
2.128+03 1.075+05 2.129+03 1.073+05 2.130+03 1.072+05 2.131+03 1.070+05
2.132+03 1.069+05 2.133+03 1.067+05 2.134+03 1.064+05 2.135+03 1.062+05
2.136+03 1.059+05 2.137+03 1.056+05 2.138+03 1.054+05 2.139+03 1.052+05
2.140+03 1.050+05 2.141+03 1.048+05 2.142+03 1.046+05 2.143+03 1.044+05
2.144+03 1.042+05 2.145+03 1.041+05 2.146+03 1.039+05 2.147+03 1.037+05
2.148+03 1.036+05 2.149+03 1.035+05 2.150+03 1.134+05 2.151+03 1.032+05
2.152+03 1.031+05 2.153+03 1.029+05 2.154+03 1.028+05 2.155+03 1.027+05
2.156+03 1.027+05 2.157+03 1.026+05 2.158+03 1.025+05 2.159+03 1.024+05
2.160+03 1.022+05 2.161+03 1.021+05 2.162+03 1.020+05 2.163+03 1.019+05
2.164+03 1.018+05 2.165+03 1.017+05 2.166+03 1.016+05 2.167+03 1.015+05

2.168+03 1.013+05 2.169+03 1.013+05 2.170+03 1.012+05 2.171+03 1.012+05
2.172+03 1.011+05 2.173+03 1.010+05 2.174+03 1.010+05 2.175+03 1.009+05
2.176+03 1.008+05 2.177+03 1.007+05 2.178+03 1.006+05 2.179+03 1.005+05
2.180+03 1.004+05 2.181+03 1.003+05 2.182+03 1.002+05 2.183+03 1.001+05
2.184+03 1.001+05 2.185+03 9.998+04 2.186+03 9.990+04 2.187+03 9.983+04
2.188+03 9.974+04 2.189+03 9.965+04 2.190+03 9.956+04 2.191+03 9.946+04
2.192+03 9.937+04 2.193+03 9.928+04 2.194+03 9.920+04 2.195+03 9.911+04
2.196+03 9.903+04 2.197+03 9.894+04 2.198+03 9.886+04 2.199+03 9.878+04
2.200+03 9.870+04 2.201+03 9.861+04 2.202+03 9.853+04 2.203+03 9.845+04
2.204+03 9.836+04 2.205+03 9.827+04 2.206+03 9.819+04 2.207+03 9.810+04
2.208+03 9.801+04 2.209+03 9.794+04 2.210+03 9.787+04 2.211+03 9.780+04
2.212+03 9.773+04 2.213+03 9.766+04 2.214+03 9.760+04 2.215+03 9.754+04
2.216+03 9.748+04 2.217+03 9.742+04 2.218+03 9.736+04 2.219+03 9.731+04
2.220+03 9.727+04 2.221+03 9.722+04 2.222+03 9.718+04 2.223+03 9.713+04
2.224+03 9.710+04 2.225+03 9.706+04 2.226+03 9.702+04 2.227+03 9.698+04
2.228+03 9.694+04 2.229+03 9.689+04 2.230+03 9.683+04 2.231+03 9.677+04
2.232+03 9.671+04 2.233+03 9.665+04 2.234+03 9.656+04 2.235+03 9.647+04
2.236+03 9.639+04 2.237+03 9.630+04 2.238+03 9.621+04 2.239+03 9.614+04
2.240+03 9.607+04 2.241+03 9.600+04 2.242+03 9.594+04 2.243+03 9.587+04
2.244+03 9.580+04 2.245+03 9.573+04 2.246+03 9.566+04 2.247+03 9.559+04
2.248+03 9.551+04 2.249+03 9.542+04 2.250+03 9.532+04 2.251+03 9.522+04
2.252+03 9.512+04 2.253+03 9.502+04 2.254+03 9.488+04 2.255+03 9.475+04
2.256+03 9.461+04 2.257+03 9.448+04 2.258+03 9.435+04 2.259+03 9.422+04
2.260+03 9.410+04 2.261+03 9.397+04 2.262+03 9.384+04 2.263+03 9.372+04
2.264+03 9.362+04 2.265+03 9.351+04 2.266+03 9.341+04 2.267+03 9.331+04
2.268+03 9.320+04 2.269+03 9.309+04 2.270+03 9.297+04 2.271+03 9.286+04
2.272+03 9.274+04 2.273+03 9.263+04 2.274+03 9.253+04 2.275+03 9.244+04
2.276+03 9.235+04 2.277+03 9.226+04 2.278+03 9.217+04 2.279+03 9.208+04
2.280+03 9.199+04 2.281+03 9.190+04 2.282+03 9.182+04 2.283+03 9.173+04
2.284+03 9.164+04 2.285+03 9.156+04 2.286+03 9.147+04 2.287+03 9.139+04
2.288+03 9.130+04 2.289+03 9.127+04 2.290+03 9.116+04 2.291+03 9.109+04
2.292+03 9.102+04 2.293+03 9.095+04 2.294+03 9.089+04 2.295+03 9.084+04
2.296+03 9.078+04 2.298+03 9.073+04 2.298+03 9.067+04 2.299+03 9.061+04
2.300+03 9.044+04

Z = 14, Si eV, barns per atom pairs 124 pts ref = 003Tr01
5.015+03 1.139+04 5.113+03 1.079+04 5.213+03 1.020+04 5.312+03 9.664+03
5.412+03 9.200+03 5.511+03 8.708+03 5.612+03 8.265+03 5.711+03 7.852+03
5.811+03 7.456+03 6.011+03 6.802+03 6.111+03 6.514+03 6.211+03 6.214+03
6.311+03 5.933+03 6.411+03 5.664+03 6.511+03 5.416+03 6.611+03 5.182+03
6.711+03 4.960+03 6.811+03 4.751+03 6.911+03 4.554+03 7.011+03 4.366+03
7.011+03 4.364+03 7.112+03 4.141+03 7.206+03 4.040+03 7.313+03 3.878+03
7.414+03 3.726+03 7.513+03 3.584+03 7.613+03 3.443+03 7.613+03 3.443+03
7.713+03 3.319+03 7.814+03 3.195+03 8.013+03 2.980+03 8.014+03 2.978+03

8.113+03 2.872+03 8.214+03 2.765+03 8.314+03 2.669+03 8.414+03 2.576+03
8.514+03 2.488+03 8.614+03 2.404+03 8.714+03 2.324+03 8.815+03 2.247+03
8.915+03 2.174+03 9.016+03 2.107+03 9.116+03 2.038+03 9.216+03 1.975+03
9.316+03 1.916+03 9.416+03 1.853+03 9.516+03 1.795+03 9.616+03 1.740+03
9.716+03 1.692+03 9.816+03 1.639+03 9.917+03 1.591+03 1.002+04 1.544+03
1.002+04 1.542+03 1.002+04 1.543+03 1.012+04 1.498+03 1.022+04 1.454+03
1.032+04 1.413+03 1.042+04 1.373+03 1.052+04 1.335+03 1.062+04 1.302+04
1.072+04 1.267+03 1.082+04 1.228+03 1.092+04 1.198+03 1.102+04 1.165+03
1.112+04 1.134+03 1.122+04 1.104+03 1.132+04 1.073+03 1.142+04 1.046+03
1.152+04 1.024+03 1.162+04 9.964+02 1.172+04 9.728+02 1.182+04 9.449+02
1.192+04 9.245+02 1.202+04 9.018+02 1.202+04 9.018+02 1.217+04 8.682+02
1.232+04 8.359+02 1.247+04 8.064+02 1.262+04 7.774+02 1.277+04 7.505+02
1.292+04 7.239+02 1.307+04 7.004+02 1.322+04 6.778+02 1.337+04 6.555+02
1.352+04 6.324+02 1.367+04 6.127+02 1.382+04 5.949+02 1.397+04 5.743+02
1.412+04 5.589+02 1.427+04 5.387+02 1.442+04 5.234+02 1.457+04 5.085+02
1.472+04 4.917+02 1.487+04 4.744+02 1.488+04 4.782+02 1.502+04 4.649+02
1.523+04 4.455+02 1.543+04 4.288+02 1.563+04 4.131+02 1.583+04 3.974+02
1.603+04 3.831+02 1.623+04 3.694+02 1.623+04 3.690+02 1.642+04 3.566+02
1.663+04 3.446+02 1.683+04 3.319+02 1.703+04 3.202+02 1.723+04 3.093+02
1.743+04 2.987+02 1.763+04 2.879+02 1.763+04 2.875+02 1.783+04 2.786+02
1.803+04 2.688+02 1.823+04 2.604+02 1.843+04 2.531+02 1.863+04 2.448+02
1.863+04 2.439+02 1.883+04 2.369+02 1.903+04 2.303+02 1.923+04 2.226+02
1.942+04 2.159+02 1.962+04 2.097+02 1.982+04 2.031+02 2.003+04 1.972+02

Z = 14, Si eV, barns per atom pairs 6 pts ref = 001Ba01
8.048+03 2.922+03 8.906+03 2.172+03 1.748+04 2.933+02 1.961+04 2.093+02
2.216+04 1.467+02 2.495+04 1.045+04

Z = 16, S eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 9.263+03 8.041+03 5.042+03

Z = 20, Ca eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 2.103+04 8.041+03 1.121+04

Z = 20, Ca eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 5.831+00 6.620+05 5.242+00 1.170+06 3.909+00 1.280+06 3.758+00
1.330+06 3.650+00

Z = 22, Ti eV, barns per atom pairs 4 pts ref = 001An01
1.744+04 1.900+03 2.210+04 9.000+02 3.206+04 3.310+02 4.423+04 1.320+02

Z = 23, V eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 3.715+04 8.041+03 2.152+04

Z = 23, V eV, barns per atom pairs 10 pts ref = 001An01
1.337+04 4.900+03 1.497+04 3.770+03 1.744+04 2.200+03 1.963+04 1.540+03
2.210+04 1.100+03 2.499+04 7.500+02 3.206+04 3.900+02 3.665+04 2.700+02
4.423+04 1.600+02 5.065+04 1.100+02

Z = 23, V eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 6.906+00 6.620+05 6.116+00 1.170+06 4.559+00 1.280+06 4.222+00
1.330+06 4.309+00

Z = 25, Mn eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 7.741+03 8.041+03 2.056+04

Z = 25, Mn eV, barns per atom pairs 8 pts ref = 001An01
1.744+04 3.200+03 1.963+04 2.290+03 2.210+04 1.600+03 2.499+04 1.160+03
3.206+04 5.500+02 3.665+04 3.900+02 4.423+04 2.190+02 5.065+04 1.630+02

Z = 26, Fe eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 6.705+03 8.041+03 2.564+04

Z = 26, Fe eV, barns per atom pairs 8 pts ref = 001An01
1.744+04 3.500+03 1.963+04 2.570+03 2.210+04 1.780+03 2.499+04 1.290+03
3.206+04 6.100+02 3.665+04 4.300+02 4.423+04 2.500+02 5.065+04 1.730+02

Z = 27, Co eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 7.741+03 8.041+03 3.733+04

Z = 27, Co eV, barns per atom pairs 8 pts ref = 001An01
1.744+04 4.000+03 1.963+04 2.500+03 2.210+04 2.100+03 2.499+04 1.310+03
3.206+04 7.400+02 3.665+04 4.500+02 4.423+04 2.830+02 5.065+04 1.750+02

Z = 28, Ni eV, barns per atom pairs 8 pts ref = 001An01
1.744+04 4.500+03 1.963+04 3.310+03 2.210+04 2.350+03 2.499+04 1.700+03
3.206+04 8.400+02 3.665+04 6.000+02 4.423+04 3.290+02 5.065+04 2.420+02

Z = 29, Cu eV, barns per atom pairs 30 pts ref = 004Le01
4.000+03 3.801+04 4.200+03 3.317+04 4.400+03 2.892+04 4.600+03 2.573+04
4.800+03 2.290+04 5.000+03 2.066+04 5.200+03 1.853+04 5.400+03 1.641+04
5.600+03 1.511+04 5.800+03 1.363+04 6.000+03 1.246+04 6.200+03 1.147+04
6.400+03 1.036+04 6.600+03 9.631+03 6.800+03 8.959+03 7.000+03 8.191+03
7.200+03 7.495+03 7.400+03 6.834+03 7.600+03 6.504+03 7.800+03 6.008+03
8.000+03 5.630+03 8.200+03 5.040+03 8.400+03 4.886+03 8.600+03 4.332+03
8.800+03 4.237+03 9.100+03 2.703+04 9.300+03 2.656+04 9.500+03 2.616+04
9.700+03 2.544+04 9.900+03 2.365+04

Z = 29, Cu eV, barns per atom pairs 14 pts ref = 002Ma01
5.895+03 1.262+04 6.400+03 1.007+04 8.041+03 5.389+03 1.053+04 1.989+04
1.440+04 8.480+03 2.414+04 2.077+03 3.080+04 1.070+03 3.500+04 7.550+02
5.201+04 2.560+02 6.430+04 1.440+02 7.083+04 1.110+02 7.287+04 1.020+02
8.100+04 7.700+01 8.430+04 6.900+01

Z = 29, Cu eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 1.015+04 8.041+03 5.487+03

Z = 29, Cu eV, barns per atom pairs 84 pts ref = 001Ch01
8.871+03 4.009+03 8.972+03 4.154+03 8.982+03 1.844+04 9.003+03 3.179+04
9.013+03 3.157+04 9.023+03 2.962+04 9.033+03 3.329+04 9.043+03 3.016+04
9.053+03 3.050+04 9.063+03 3.117+04 9.073+03 3.254+04 9.083+03 3.284+04
9.093+03 3.071+04 9.103+03 2.930+04 9.113+03 3.009+04 9.123+03 3.096+04
9.133+03 3.225+04 9.183+03 3.064+04 9.233+03 2.994+04 9.283+03 2.867+04
9.333+03 2.857+04 9.384+03 2.823+04 9.434+03 2.759+04 9.634+03 2.585+04
9,835+03 2.427+04 9.836+03 2.437+04 1.004+04 2.297+04 1.044+04 2.068+04
1.064+04 1.964+04 1.084+04 1.866+04 1.104+04 1.775+04 1.125+04 1.692+04
1.145+04 1.612+04 1.165+04 1.540+04 1.185+04 1.470+04 1.205+04 1.406+04
1.245+04 1.287+04 1.266+04 1.233+04 1.286+04 1.180+04 1.306+04 1.133+04
1.326+04 1.086+04 1.346+04 1.044+04 1.366+04 1.002+04 1.386+04 9.639+03
1.407+04 9.277+03 1.427+04 8.931+03 1.447+04 8.592+03 1.467+04 8.289+03
1.487+04 7.977+03 1.507+04 7.705+03 1.527+04 7.424+03 1.547+04 7.181+03
1.548+04 7.171+03 1.558+04 7.045+03 1.568+04 6.931+03 1.568+04 6.933+03
1.568+04 6.934+03 1.588+04 6.691+03 1.608+04 6.475+03 1.628+04 6.254+03
1.648+04 6.053+03 1.669+04 5.848+03 1.689+04 5.670+03 1.709+04 5.483+03
1.729+04 5.317+03 1.750+04 4.876+03 1.770+04 5.001+03 1.770+04 5.002+03
1.770+04 4.995+03 1.790+04 4.841+03 1.810+04 4,698+03 1.830+04 4.554+03
1.850+04 4.423+03 1.871+04 4.297+03 1.871+04 4.297+03 1.871+04 4.293+03
1.891+04 4.167+03 1.910+04 4.049+03 1.930+04 3.938+03 1.949+04 3.830+03
1.968+04 3.733+03 1.986+04 3.643+03 2.003+04 3.562+03 2.003+04 3.561+03

Z = 29, Cu eV, barns per atom pairs 6 pts ref = 001An01
2.210+04 2.570+03 2.499+04 1.830+03 3.206+04 9.200+02 3.665+04 7.100+02
4.423+04 3.730+02 5.065+04 2.500+02

Z = 29, Cu eV, barns per atom pairs 47 pts ref = 78Gi01
9.620+06 3.269+00 9.870+06 3.282+00 1.013+07 3.289+00 1.037+07 3.291+00
1.061+07 3.297+00 1.086+07 3.305+00 1.112+07 3.315+00 1.134+07 3.322+00
1.150+07 3.326+00 1.417+07 3.446+00 1.440+07 3.458+00 1.464+07 3.454+00
1.486+07 3.453+00 1.514+07 3.495+00 1.537+07 3.498+00 1.560+07 3.530+00
1.587+07 3.537+00 1.610+07 3.553+00 1.635+07 3.570+00 1.664+07 3.587+00
1.687+07 3.605+00 1.711+07 3.611+00 1.736+07 3.611+00 1.761+07 3.634+00
1.788+07 3.622+00 1.814+07 3.618+00 1.839+07 3.643+00 1.864+07 3.659+00

1.886+07 3.642+00 1.911+07 3.662+00 1.936+07 3.682+00 1.964+07 3.681+00
4.692+07 4.290+00 4.742+07 4.273+00 4.790+07 4.341+00 4.839+07 4.275+00
4.887+07 4.347+00 4.936+07 4.302+00 4.984+07 4.325+00 5.034+07 4.325+00
5.083+07 4.383+00 5.136+07 4.367+00 5.185+07 4.366+00 5.238+07 4.374+00
5.286+07 4.382+00 5.340+07 4.400+00 5.388+07 4.386+00

Z = 30, Zn eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 1.160+04 8.041+03 6.547+03

Z = 30, Zn eV, barns per atom pairs 10 pts ref = 001An01
1.337+04 1.200+04 1.497+04 9.300+03 1.744+04 5.950+03 1.963+04 4.100+03
2.210+04 2.540+03 2.499+04 2.130+03 3.206+04 1.050+03 3.665+04 7.500+02
4.423+04 4.340+02 5.065+04 2.960+02

Z = 32, Ge eV, barns per atom pairs 6 pts ref = 001Ba01
8.048+03 7.925+03 8.906+03 5.975+03 1.748+04 7.123+03 1.961+04 5.183+03
2.216+04 3.720+03 2.495+04 2.674+03

Z = 34, Se eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 1.038+01 6.620+05 9.294+00 1.170+06 6.792+00 1.280+06 6.388+00
1.330+06 6.064+00

Z = 36, Kr eV, barns per atom pairs 40 pts ref = 002Su01
1.000+02 1.351+06 1.050+02 1.531+06 1.100+02 1.880+06 1.200+02 2.650+06
1.300+02 3.440+06 1.400+02 4.140+06 1.500+02 4.610+06 1.600+02 4.930+06
1.700+02 5.060+06 1.800+02 5.120+06 1.900+02 5.130+06 2.000+02 5.080+06
2.200+02 5.320+06 2.400+02 5.040+06 2.600+02 4.790+06 2.800+02 4.530+06
3.000+02 4.310+06 3.200+02 4.000+06 4.400+02 3.680+06 3.600+02 3.400+06
3.800+02 3.120+06 4.000+02 2.880+06 4.500+02 2.330+06 5.000+02 1.880+06
5.500+02 1.561+06 6.000+02 1.312+06 6.500+02 1.106+06 7.000+02 9.390+05
7.500+02 8.060+05 8.000+02 6.940+05 8.500+02 6.020+05 9.000+02 5.250+05
9.500+02 4.600+05 1.000+03 4.070+05 1.050+03 3.610+05 1.100+03 3.250+05
1.150+03 2.900+05 1.200+03 2.630+05 1.250+03 2.410+05 1.300+03 2.250+05

Z = 40, Zr eV, barns per atom pairs 14 pts ref = 002Ma01
5.895+03 4.715+04 6.400+03 3.775+04 8.041+03 2.036+04 1.053+04 9.818+03
1.440+04 4.211+03 2.414+04 6.619+03 3.080+04 3.435+03 3.500+04 2.435+03
5.201+04 8.380+02 6.430+04 4.740+02 7.083+04 3.650+02 7.287+04 3.380+02
8.100+04 2.540+02 8.430+04 2.280+02

Z = 40, Zr eV, barns per atom pairs 9 pts ref = 001An01
1.337+04 5.200+03 1.497+04 3.800+03 1.744+04 2.500+03 2.210+04 8.400+03
2.499+04 6.150+03 3.206+04 3.070+03 3.665+04 2.160+03 4.423+04 1.270+03
5.065+04 8.800+02

Z = 40, Zr eV, barns per atom pairs 12 pts ref = 002Ta01
1.722+04 2.448+03 1.748+04 2.081+03 1.767+04 1.913+03 1.780+04 1.447+03
1.786+04 1.527+03 1.799+04 1.643+03 1.806+04 1.846+03 1.818+04 2.243+03
1.825+04 3.946+03 1.838+04 1.247+04 1.876+04 1.260+04 1.934+04 1.272+04

Z = 41, Nb eV, barns per atom pairs 10 pts ref = 001An01
1.337+04 5.500+03 1.497+04 4.200+03 1.744+04 2.650+03 1.963+04 1.130+04
2.210+04 9.400+03 2.499+04 6.810+03 3.206+04 3.400+03 3.665+04 2.390+03
4.423+04 1.420+03 5.065+04 9.800+02

Z = 41, Nb eV, barns per atom pairs 9 pts ref = 002Ta01
1.857+04 2.055+03 1.870+04 1.884+03 1.876+04 2.093+03 1.883+04 2.329+03
1.896+04 6.117+03 1.902+04 1.247+04 1.928+04 1.569+04 1.966+04 1.208+04
2.011+04 1.202+04

Z = 41, Nb eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 1.549+03 5.950+04 7.337+02

Z = 42, Mo eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 4.591+04 8.041+03 2.524+04

Z = 42, Mo eV, barns per atom pairs 3 pts ref = 001An01
1.337+04 6.200+03 1.497+04 3.900+03 1.744+04 2.930+03

Z = 42, Mo eV, barns per atom pairs 8 pts ref = 002Ta01
1.966+04 1.333+03 1.985+04 1.550+03 1.998+04 1.585+03 2.005+04 3.298+03
2.011+04 5.297+03 2.018+04 9.415+03 2.030+04 1.184+04 2.056+04 1,255+04

Z = 42, Mo eV, barns per atom pairs 1 pt ref = 97Ro01
5.950+04 6.872+02

Z = 42, Mo eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 1.403+01 6.620+05 1.168+01 1.170+06 8.850+00 1.280+06 8.122+00
1.330+06 8.001+00

Z = 45, Rh eV, barns per atom pairs 9 pts ref = 001An01
1.337+04 9.100+03 1.497+04 6.900+03 1.744+04 4.000+03 1.963+04 2.890+03
2.210+04 2.100+03 3.206+04 4.750+03 3.665+04 3.300+03 4.423+04 2.020+03
5.065+04 1.470+03

Z = 45, Rh eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 1.501+01 6.620+05 1.260+01 1.170+06 9.255+00 1.280+06 8.645+00
1.330+06 8.488+00

Z = 46, Pd eV, barns per atom pairs 3 pts ref = 001An01
1.337+04 8.800+03 1.744+04 4.200+03 1.963+04 3.300+03

Z = 47, Ag eV, barns per atom pairs 14 pts ref = 002Ma01
5.895+03 8.879+04 6.400+03 7.109+04 8.041+03 3.836+04 1.053+04 1.850+03
1.440+04 7.937+03 2.414+04 1.964+03 3.080+04 6.119+03 3.500+04 4.333+03
5.201+04 1.487+03 6.430+04 8.390+02 7.083+04 6.460+02 7.287+04 5.980+02
8.100+04 4.500+02 8.430+04 4.040+02

Z = 47, Ag eV, barns per atom pairs 4 pts ref = 001An01
1.337+04 9.700+03 1.497+04 7.700+03 1.744+04 4.700+03 1.963+04 3.500+03

Z = 48, Cd eV, barns per atom pairs 9 pts ref = 004Ko01
2.578+04 1.773+03 2.608+04 1.717+03 2.638+04 1.661+03 2.659+04 1.643+03
2.682+04 1.021+04 2.713+04 9.650+03 2.748+04 9.258+03 2.794+04 8.792+03
2.853+04 8.269+03

Z = 48, Cd eV, barns per atom pairs 2 pts ref = 001An01
4.423+04 2.460+03 5.065+04 1.770+03

Z = 48, Cd eV, barns per atom pairs 1 pt ref = 97Ro01
5.950+04 1.243+03

Z = 48, Cd eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 1.698+01 6.620+05 1.418+01 1.170+06 1.012+01 1.280+06 9.303+00
1.330+06 9.094+00

Z = 49, In eV, barns per atom pairs 5 pts ref = 001An01
1.744+04 4.000+03 2.210+04 2.900+03 3.206+04 6.540+03 4.423+04 2.740+03
5.065+04 1.910+03

Z = 49, In eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 2.760+03 5.950+04 1.352+03

Z = 49, In eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 1.819+01 6.620+05 1.464+01 1.170+06 1.017+01 1.280+06 8.833+00
1.330+06 8.898+00

Z = 50, Sn eV, barns per atom pairs 14 pts ref = 002Ma01
5.895+03 1.100+05 6.400+03 8.841+04 8.041+03 4.824+04 1.053+04 2.358+03
1.440+04 1.027+04 2.414+04 2.607+03 3.080+04 7.681+03 3.500+04 5.464+03
5.201+04 1.903+03 6.430+04 1.082+03 7.083+04 8.360+02 7.287+04 7.750+02
8.100+04 5.850+02 8.430+04 5.260+02

Z = 50, Sn eV, barns per atom pairs 128 pts ref = 78Gi01

9.620+06 7.641+00 9.870+06 7.686+00 1.013+07 7.740+00 1.037+07 7.776+00
1.061+07 7.822+00 1.087+07 7.870+00 1.112+07 7.902+00 1.136+07 7.973+00
1.158+07 8.028+00 1.186+07 8.060+00 1.210+07 8.091+00 1.234+07 8.168+00
1.261+07 8.210+00 1.286+07 8.279+00 1.311+07 8.325+00 1.336+07 8.402+00
1.361+07 8.438+00 1.387+07 8.486+00 1.411+07 8.555+00 1.439+07 8.617+00
1.464+07 8.662+00 1.487+07 8.757+00 1.512+07 8.785+00 1.537+07 8.800+00
1.560+07 8.860+00 1.585+07 8.913+00 1.611+07 8.896+00 1.635+07 8.928+00
1.664+07 8.974+00 1.688+07 9.013+00 1.710+07 9.043+00 1.735+07 9.078+00
1.761+07 9.078+00 1.790+07 9.098+00 1.814+07 9.091+00 1.839+07 9.144+00
1.864+07 9.156+00 1.888+07 9.179+00 1.912+07 9.229+00 1.936+07 9.219+00
1.962+07 9.248+00 1.988+07 9.275+00 2.015+07 9.290+00 2.037+07 9.361+00
2.057+07 9.398+00 2.086+07 9.392+00 2.114+07 9.421+00 2.136+07 5.418+00
2.157+07 9.484+00 2.180+07 9.506+00 2.207+07 9.508+00 2.236+07 9.537+00
2.264+07 9.600+07 2.279+07 9.595+00 2.308+07 9.654+00 2.337+07 9.625+00
2.365+07 9.668+00 2.383+07 9.700+00 2.405+07 9.704+00 2.433+07 9.736+00
2.464+07 9.787+00 2.490+07 9.842+00 2.515+07 9.876+00 2.528+07 9.825+00
2.556+07 9.880+00 2.583+07 9.882+00 2.612+07 9.965+00 2.630+07 9.978+00
2.656+07 9.982+00 2.683+07 1.003+01 2.710+07 1.000+01 2.737+07 1.004+01
2.757+07 1.006+01 2.783+07 1.013+01 2.811+07 1.013+01 2.839+07 1.014+01
2.856+07 1.012+01 2.884+07 1.017+01 2.913+07 1.018+01 2.942+07 1.024+01
2.958+07 1.033+01 2.985+07 1.031+01 3.015+07 1.033+01 3.045+07 1.028+01
3.068+07 1.037+01 3.085+07 1.036+01 3.112+07 1.032+01 3.139+07 1.039+01
3.161+07 1.035+01 3.186+07 1.046+01 3.211+07 1.042+01 3.238+07 1.052+01
3.262+07 1.046+01 3.278+07 1.061+01 3.308+07 1.050+01 3.339+07 1.056+01
3.360+07 1.060+01 3.377+07 1.056+01 3.410+07 1.064+01 3.443+07 1.059+01
3.466+07 1.067+01 3.479+07 1.064+01 3.512+07 1.060+01 3.545+07 1.067+01
3.573+07 1.068+01 3.582+07 1.072+01 3.615+07 1.081+01 3.647+07 1.092+01
3.679+07 1.084+01 4.790+07 1.150+01 4.840+07 1.165+01 4.889+07 1.160+01
4.939+07 1.160+01 4.987+07 1.165+01 5.037+07 1.163+01 5.087+07 1.168+01
5.136+07 1.161+01 5.185+07 1.173+01 5.238+07 1.168+01 5.286+07 1.173+01
5.340+07 1.175+01 5.388+07 1.175+01 1.004+08 1.335+01 1.013+08 1.343+01
1.025+08 1.347+01 1.035+08 1.351+01 1.046+08 1.335+01 1.056+08 1.350+01

Z = 54, Xe eV, barns per atom pairs 110 pts ref = 003Su01

8.600+01 1.960+07 9.000+01 2.420+07 9.500+01 2.760+07 1.000+02 2.870+07
1.050+02 2.710+07 1.100+02 2.380+07 1.200+02 1.500+07 1.300+02 7.830+06
1.350+02 5.360+06 1.400+02 3.570+06 1.410+02 3.400+06 1.414+02 3.600+06
1.417+02 3.970+06 1.424+02 3.370+06 1.433+02 2.830+06 1.439+02 3.150+06
1.443+02 2.880+06 1.450+02 2.850+06 1.460+02 2.630+06 1.470+02 2.540+06
1.500+02 2.180+06 1.600+02 1.360+06 1.700+02 9.890+05 1.800+02 8.790+05
1.900+02 9.010+05 2.000+02 9.730+05 2.099+02 1.100+06 2.110+02 1.150+06
2.157+02 1.200+06 2.200+02 1.220+06 2.300+02 1.310+06 2.400+02 1.390+06
2.500+02 1.470+06 2.600+02 1.530+06 2.700+02 1.570+06 2.800+02 1.590+06

2.900+02 1.590+06 3.000+02 1.600+06 3.100+02 1.590+06 3.200+02 1.580+06
3.300+02 1.550+06 3.400+02 1.500+06 3.500+02 1.450+06 3.600+02 1.400+06
3.700+02 1.390+06 3.800+02 1.370+06 3.900+02 1.340+06 4.000+02 1.300+06
4.200+02 1.240+06 4.400+02 1.170+06 4.600+02 1.110+06 4.800+02 1.050+06
5.000+02 9.960+05 5.250+02 9.290+05 5.500+02 8.650+05 5.750+02 8.070+05
6.000+02 7.530+05 6.250+02 7.040+05 6.500+02 6.590+05 6.600+02 6.430+05
6.700+02 5.840+05 6.750+02 6.860+05 6.775+02 7.870+05 6.800+02 9.390+05
6.820+02 1.590+06 6.840+02 2.520+06 6.860+02 3.310+06 6.880+02 3.730+06
6.900+02 3.770+06 6.920+02 3.560+06 6.940+02 3.400+06 6.960+02 3.570+06
6.980+02 4.230+06 7.000+02 4.870+06 7.020+02 5.190+06 7.040+02 5.120+06
7.060+02 4.820+06 7.080+02 4.480+06 7.100+02 4.170+06 7.150+02 3.700+06
7.200+02 3.410+06 7.300+02 3.100+06 7.400+02 2.930+06 7.500+02 2.820+06
7.750+02 2.600+06 8.000+02 2.430+06 8.250+02 2.300+06 8.500+02 2.200+06
8.750+02 2.120+06 9.000+02 2.030+06 9.100+02 2.000+06 9.200+02 1.980+06
9.250+02 1.970+06 9.300+02 1.990+06 9.350+02 2.060+06 9.400+02 2.120+06
9.450+02 2.120+06 9.500+02 2.090+06 9.600+02 2.050+06 9.700+02 2.010+06
9.800+02 1.980+06 9.900+02 1.970+06 9.950+02 1.980+06 1.000+03 2.000+06
1.005+03 2.000+06 1.010+03 1.980+06 1.020+03 1.940+06 1.030+03 1.910+06
1.050+03 1.840+06 1.080+03 1.750+06

Z = 57, La eV, barns per atom pairs 13 pts ref = 002Ma02
6.400+03 1.426+05 8.041+03 7.980+04 1.053+04 3.930+04 1.440+04 1.710+04
2.414+04 4.290+03 3.080+04 2.220+03 3.500+04 1.590+03 5.201+04 3.000+03
6.430+04 1.710+03 7.083+04 1.330+03 7.287+04 1.240+03 8.100+04 9.500+02
8.430+04 8.400+02

Z = 58, Ce eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 2.135+03

Z = 58, Ce eV, barns per atom pairs 12 pts ref = 002Ma02
8.041+03 8.548+04 1.053+04 4.197+04 1.440+04 1.825+04 2.414+04 4.530+03
3.080+04 2.380+03 3.500+04 1.680+03 5.201+04 3.190+03 6.430+04 1.830+03
7.083+04 1.410+03 7.287+04 1.310+03 8.100+04 9.900+02 8.430+04 8.900+02

Z = 59, Pr eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 2.397+03

Z = 59, Pr eV, barns per atom pairs 12 pts ref = 002Ma02
8.041+03 9.068+04 1.053+04 4.583+04 1.440+04 1.950+04 2.414+04 4.930+03
3.080+04 2.550+03 3.500+04 1.810+03 5.201+04 3.380+03 6.430+04 1.940+03
7.083+04 1.500+03 7.287+04 1.400+03 8.100+04 1.050+03 8.430+04 9.500+02

Z = 60, Nd eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 2.548+03

Z = 60, Nd eV, barns per atom pairs 12 pts ref = 002Ma02
8.041+03 9.657+04 1.053+04 4.757+04 1.440+04 2.092+04 2.414+04 5.260+03
3.080+04 2.740+03 3.500+04 1.960+03 5.201+04 3.560+03 6.430+04 2.050+03
7.083+04 1.600+03 7.287+04 1.480+03 8.100+04 1.120+03 8.430+04 1.000+03

Z = 62, Sm eV, barns per atom pairs 11 pts ref = 002Ma02
1.053+04 5.391+04 1.440+04 2.374+04 2.414+04 6.010+03 3.080+04 3.160+03
3.500+04 2.220+03 5.201+04 3.990+03 6.430+04 2.250+03 7.083+04 1.800+03
7.287+04 1.660+03 8.100+04 1.260+03 8.430+04 1.130+03

Z = 63, Eu eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 2.872+03

Z = 64, Gd eV, barns per atom pairs 11 pts ref = 002Ma02
1.053+04 6.059+04 1.440+04 2.690+04 2.414+04 6.920+03 3.080+04 3.600+03
3.500+04 2.550+03 5.201+04 4.550+03 6.430+04 2.570+03 7.083+04 2.000+03
7.287+04 1.860+03 8.100+04 1.400+03 8.430+04 1.260+03

Z = 64, Gd eV, barns per atom pairs 1 pt ref = 97Ro01
5.950+04 3.462+03

Z = 64, Gd eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 3.050+03

Z = 64, Gd eV, barns per atom pairs 1 pt ref = 96Er01
5.960+04 3.071+03

Z = 65, Tb eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 3.178+03

Z = 65, Tb eV, barns per atom pairs 1 pt ref = 96Er01
5.960+04 3.086+03

Z = 66, Dy eV, barns per atom pairs 11 pts ref = 002Ma02
1.053+04 6.831+04 1.440+04 3.000+04 2.414+04 7.720+03 3.080+04 4.060+03
3.500+04 2.900+03 5.201+04 1.040+03 6.430+04 2.840+03 7.083+04 2.220+03
7.287+04 2.100+03 8.100+04 1.570+03 8.430+04 1.410+03

Z = 66, Dy eV, barns per atom pairs 1 pt ref = 97Ro01
4.300+04 1.497+03

Z = 66, Dy eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 3.396+03

Z = 66, Dy eV, barns per atom pairs 1 pt ref = 96Er01
5.960+04 3.284+03

Z = 67, Ho eV, barns per atom pairs 11 pts ref = 002Ma02
1.053+04 7.218+04 1.440+04 3.212+04 2.414+04 8.200+03 3.080+04 4.320+03
3.500+04 3.090+03 5.201+04 1.080+03 6.430+04 2.990+03 7.083+04 2.340+03
7.287+04 2.180+03 8.100+04 1.660+03 8.430+04 1.500+03

Z = 67, Ho eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 3.528+03

Z = 68, Er eV, barns per atom pairs 11 pts ref = 002Ma02
1.053+04 7.581+04 1.440+04 3.391+04 2.414+04 8.670+03 3.080+04 4.650+03
3.500+04 3.260+03 5.201+04 1.150+03 6.430+04 3.170+03 7.083+04 2.470+03
7.287+04 2.280+03 8.100+04 1.740+03 8.430+04 1.560+03

Z = 68, Er eV, barns per atom pairs 1 pt ref = 97Ro01
5.950+04 4.033+03

Z = 68, Er eV, barns per atom pairs 1 pt ref = 99Ka01
5.954+04 3.749+03

Z = 68, Er eV, barns per atom pairs 1 pt ref = 96Er01
5.960+04 3.613+03

Z = 70, Yb eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 2.095+03 5.950+04 9.416+02

Z = 73, Ta eV, barns per atom pairs 286 pts ref = 003Le01
1.453+03 4.918+05 1.463+03 4.511+05 1.473+03 4.675+05 1.483+03 4.664+05
1.493+03 4.486+05 1.503+03 4.466+05 1.513+03 4.381+05 1.523+03 4.247+05
1.533+03 4.149+05 1.543+03 4.280+05 1.553+03 3.995+05 1.563+03 4.044+05
1.573+03 3.815+05 1.583+03 3.874+05 1.593+03 3.661+05 1.603+03 3.672+05
1.613+03 3.453+05 1.623+03 3.517+05 1.633+03 3.515+05 1.643+03 3.601+05
1.653+03 3.370+05 1.663+03 3.520+05 1.673+03 3.314+05 1.683+03 3.378+05
1.693+03 3.315+05 1.703+03 3.189+05 1.706+03 3.118+05 1.708+03 3.103+05
1.711+03 3.074+05 1.713+03 3.109+05 1.716+03 3.074+05 1.718+03 3.034+05
1.720+03 2.968+05 1.723+03 3.050+05 1.726+03 3.007+05 1.728+03 3.025+05
1.730+03 3.066+05 1.733+03 3.135+05 1.736+03 3.103+05 1.738+03 3.125+05
1.741+03 3.270+05 1.743+03 3.400+05 1.746+03 3.826+05 1.748+03 4.088+05
1.751+03 4.332+05 1.753+03 4.272+05 1.756+03 4.805+05 1.758+03 5.126+05
1.761+03 5.432+05 1.763+03 5.725+05 1.766+03 6.114+05 1.768+03 6.498+05
1.771+03 6.754+05 1.773+03 6.923+05 1.776+03 6.991+05 1.778+03 7.076+05
1.781+03 7.064+05 1.783+03 7.167+05 1.786+03 7.151+05 1.788+03 7.150+05

1.791+03 7.174+05 1.793+03 7.197+05 1.796+03 7.241+05 1.798+03 7.311+05
1.801+03 7.388+05 1.803+03 7.686+05 1.806+03 7.887+05 1.808+03 8.041+05
1.811+03 8.210+05 1.813+03 8.342+05 1.816+03 8.579+05 1.818+03 8.777+05
1.821+03 9.061+05 1.823+03 9.307+05 1.826+03 9.647+05 1.828+03 9.816+05
1.831+03 9.927+05 1.833+03 9.943+05 1.836+03 9.949+05 1.838+03 1.003+06
1.840+03 9.966+05 1.843+03 9.980+05 1.846+03 9.935+05 1.848+03 9.961+05
1.851+03 1.005+06 1.853+03 1.002+06 1.856+03 1.015+06 1.858+03 1.014+06
1.861+03 1.017+06 1.863+03 1.021+06 1.866+03 1.019+06 1.868+03 1.032+06
1.871+03 1.032+06 1.873+03 1.039+06 1.876+03 1.039+06 1.878+03 1.038+06
1.881+03 1.044+06 1.883+03 1.040+06 1.886+03 1.042+06 1.888+03 1.036+06
1.891+03 1.037+06 1.893+03 1.031+06 1.896+03 1.033+06 1.898+03 1.041+06
1.901+03 1.033+06 1.903+03 1.031+06 1.906+03 1.034+06 1.908+03 1.020+06
1.911+03 1.026+06 1.913+03 1.020+06 1.916+03 1.017+06 1.918+03 1.025+06
1.921+03 1.023+06 1.923+03 1.026+06 1.926+03 1.024+06 1.928+03 1.024+06
1.931+03 1.021+06 1.933+03 1.023+06 1.936+03 1.022+06 1.938+03 1.020+06
1.941+03 1.023+06 1.943+03 1.018+06 1.946+03 1.013+06 1.948+03 1.016+06
1.951+03 1.007+06 1.953+03 9.938+05 1.956+03 1.005+06 1.958+03 1.001+06
1.961+03 9.986+05 1.963+03 9.948+05 1.966+03 9.953+05 1.968+03 9.879+05
1.971+03 9.940+05 1.973+03 9.846+05 1.976+03 9.793+05 1.978+03 9.891+05
1.981+03 9.870+05 1.983+03 9.835+05 1.986+03 9.876+05 1.988+03 9.813+05
1.991+03 9.843+05 1.993+03 9.772+05 1.996+03 9.821+05 1.998+03 9.790+05
2.001+03 9.841+05 2.003+03 9.750+05 2.006+03 9.675+05 2.008+03 9.637+05
2.011+03 9.666+05 2.013+03 9.658+05 2.016+03 9.551+05 2.018+03 9.593+05
2.021+03 9.578+05 2.023+03 9.548+05 2.026+03 9.521+05 2.028+03 9.508+05
2.031+03 9.461+05 2.033+03 9.449+05 2.036+03 9.381+05 2.038+03 9.378+05
2.041+03 9.378+05 2.043+03 9.337+05 2.046+03 9.325+05 2.048+03 9.369+05
2.051+03 9.315+05 2.053+03 9.291+05 2.056+03 9.236+05 2.058+03 9.241+05
2.061+03 9.128+05 2.063+03 9.157+05 2.066+03 9.141+05 2.068+03 9.153+05
2.071+03 9.154+05 2.073+03 9.039+05 2.076+03 9.080+05 2.078+03 9.042+05
2.081+03 9.022+05 2.083+03 9.024+05 2.086+03 8.938+05 2.088+03 9.002+05
2.091+03 8.943+05 2.093+03 8.916+05 2.096+03 8.895+05 2.098+03 8.913+05
2.101+03 8.861+05 2.103+03 8.872+05 2.106+03 8.835+05 2.108+03 8.793+05
2.111+03 8.843+05 2.113+03 8.791+05 2.116+03 8.776+05 2.118+03 8.730+05
2.121+03 8.753+05 2.123+03 8.767+05 2.126+03 8.675+05 2.128+03 8.683+05
2.131+03 8.669+05 2.133+03 8.666+05 2.136+03 8.692+05 2.138+03 8.595+05
2.141+03 8.611+05 2.143+03 8.592+05 2.146+03 8.578+05 2.148+03 8.630+05
2.151+03 8.466+05 2.153+03 8.541+05 2.156+03 8.521+05 2.158+03 8.502+05
2.161+03 8.503+05 2.163+03 8.460+05 2.166+03 8.510+05 2.168+03 8.482+05
2.171+03 8.440+05 2.173+03 8.459+05 2.176+03 8.480+05 2.178+03 8.541+05
2.181+03 8.616+05 2.183+03 8.695+05 2.186+03 9.035+05 2.188+03 9.405+05
2.191+03 9.999+05 2.193+03 1.030+06 2.196+03 1.026+06 2.198+03 1.002+06
2.201+03 9.755+05 2.203+03 9.604+05 2.206+03 9.485+05 2.208+03 9.422+05
2.211+03 9.347+05 2.213+03 9.252+05 2.216+03 9.274+05 2.218+03 9.181+05
2.221+03 9.164+05 2.223+03 9.156+05 2.226+03 9.057+05 2.228+03 9.062+05

2.231+03 9.057+05 2.233+03 8.976+05 2.236+03 8.986+05 2.238+03 9.012+05
2.241+03 8.956+05 2.243+03 8.930+05 2.246+03 8.918+05 2.248+03 9.009+05
2.251+03 8.893+05 2.253+03 8.824+05 2.256+03 8.809+05 2.258+03 8.853+05
2.261+03 8.798+05 2.263+03 8.759+05 2.266+03 8.793+05 2.268+03 8.786+05
2.271+03 8.823+05 2.273+03 8.796+05 2.276+03 8.733+05 2.278+03 8.656+05
2.281+03 8.745+05 2.283+03 8.611+05 2.286+03 8.631+05 2.288+03 8.664+05
2.291+03 8.689+05 2.293+03 8.574+05 2.296+03 8.557+05 2.298+03 8.595+05
2.301+03 8.447+05 2.303+03 8.532+05 2.306+03 8.508+05 2.308+03 8.530+05
2.311+03 8.467+05 2.313+03 8.437+05 2.316+03 8.428+05 2.318+03 8.414+05
2.321+03 8.405+05 2.323+03 8.301+05 2.326+03 8.340+05 2.328+03 8.297+05
2.331+03 8.308+05 2.333+03 8.340+05 2.336+03 8.268+05 2.338+03 8.303+05
2.341+03 8.367+05 2.343+03 8.280+05 2.346+03 8.355+05 2.348+03 8.312+05
2.351+03 8.279+05 2.353+03 8.266+05

Z = 73, Ta eV, barns per atom pairs 2 pts ref = 97Ke01
6.400+03 8.747+04 8.041+03 4.886+04

Z = 73, Ta eV, barns per atom pairs 4 pts ref = 001An01
1.337+04 5.310+03 1.497+04 4.020+03 1.744+04 2.640+03 1.963+04 1.975+03

Z = 73, Ta eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 2.623+03 5.950+04 1.061+03

Z = 73, Ta eV, barns per atom pairs 132 pts ref = 78Gi01
9.610+06 1.418+01 9.860+06 1.424+01 1.011+07 1.439+01 1.036+07 1.449+01
1.057+07 1.457+01 1.120+07 1.501+01 1.140+07 1.498+01 1.160+07 1.503+01
1.185+07 1.519+01 1.210+07 1.534+01 1.236+07 1.545+01 1.263+07 1.554+01
1.398+07 1.610+01 1.415+07 1.621+01 1.437+07 1.624+01 1.463+07 1.638+01
1.489+07 1.642+01 1.514+07 1.658+01 1.538+07 1.665+01 1.562+07 1.674+01
1.586+07 1.684+01 1.887+07 1.745+01 1.913+07 1.751+01 1.937+07 1.763+01
1.962+07 1.767+01 1.988+07 1.771+01 2.013+07 1.777+01 2.037+07 1.779+01
2.063+07 1.790+01 2.086+07 1.795+01 2.109+07 1.805+01 2.826+07 1.954+01
2.876+07 1.973+01 2.925+07 1.976+01 2.976+07 1.991+01 3.026+07 1.992+01
3.078+07 2.002+01 3.123+07 2.008+01 3.173+07 2.013+01 3.226+07 2.030+01
3.270+07 2.042+01 3.307+07 2.029+01 3.724+07 2.114+01 3.769+07 2.128+01
3.821+07 2.131+01 3.872+07 2.130+01 3.920+07 2.134+01 3.972+07 2.132+01
4.024+07 2.147+01 4.075+07 2.156+01 4.123+07 2.159+01 4.170+07 2.153+01
4.220+07 2.170+01 4.272+07 2.167+01 4.328+07 2.169+01 4.370+07 2.174+01
4.691+07 2.263+01 4.740+07 2.254+01 4.790+07 2.252+01 4.839+07 2.264+01
4.889+07 2.269+01 4.938+07 2.290+01 4.989+07 2.288+01 5.039+07 2.286+01
5.088+07 2.288+01 5.137+07 2.295+01 5.185+07 2.308+01 5.235+07 2.309+01
5.285+07 2.322+01 5.336+07 2.329+01 5.387+07 2.330+01 5.436+07 2.326+01
7.067+07 2.503+01 7.124+07 2.470+01 7.182+07 2.462+01 7.222+07 2.480+01
7.277+07 2.478+01 7.332+07 2.482+01 7.374+07 2.484+01 7.428+07 2.482+01

7.483+07 2.482+01 7.525+07 2.501+01 7.555+07 2.496+01 7.652+07 2.504+01
7.747+07 2.519+01 7.850+07 2.513+01 7.949+07 2.519+01 8.028+07 2.528+01
8.109+07 2.520+01 9.356+07 2.597+01 9.456+07 2.617+07 9.555+07 2.603+01
9.654+07 2.613+01 9.753+07 2.619+01 9.851+07 2.631+01 9.952+07 2.615+01
1.005+08 2.622+01 1.015+08 2.624+01 1.025+08 2.618+01 1.034+08 2.635+01
1.045+08 2.627+01 1.055+08 2.636+01 1.065+08 2.630+01 1.075+08 2.675+01
1.085+08 2.643+01 1.131+08 2.677+01 1.142+08 2.665+01 1.153+08 2.719+01
1.164+08 2.705+01 1.174+08 2.715+01 1.185+08 2.706+01 1.196+08 2.712+01
1.206+08 2.724+01 1.213+08 2.725+01 1.222+08 2.726+01 1.234+08 2.729+01
1.245+08 2.727+01 1.256+08 2.740+01 1.261+08 2.742+01 1.283+08 2.754+01
1.301+08 2.708+01 1.426+08 2.765+01 1.440+08 2.779+01 1.460+08 2.778+01
1.480+08 2.797+01 1.499+08 2.806+01 1.520+08 2.808+01 1.541+08 2.798+01
1.560+08 2.815+01 1.579+08 2.818+01 1.598+08 2.816+01 1.618+08 2.830+01

Z = 74, W eV, barns per atom pairs 502 pts ref = 003Le01
1.453+03 5.889+05 1.463+03 5.810+05 1.473+03 5.753+05 1.483+03 5.611+05
1.493+03 5.539+05 1.503+03 5.503+05 1.513+03 5.361+05 1.523+03 5.310+05
1.533+03 5.213+05 1.543+03 5.084+05 1.553+03 4.994+05 1.563+03 5.022+05
1.573+03 4.810+05 1.583+03 4.892+05 1.593+03 4.740+05 1.603+03 4.681+05
1.613+03 4.605+05 1.623+03 4.507+05 1.633+03 4.478+05 1.643+03 4.331+05
1.653+03 4.483+05 1.663+03 4.234+05 1.673+03 4.189+05 1.683+03 4.059+05
1.693+03 4.008+05 1.703+03 3.981+05 1.713+03 3.930+05 1.723+03 3.816+05
1.733+03 3.745+05 1.743+03 3.657+05 1.753+03 3.660+05 1.756+03 3.394+05
1.761+03 3.510+05 1.766+03 3.467+05 1.771+03 3.373+05 1.776+03 3.369+05
1.781+03 3.431+05 1.786+03 3.431+05 1.791+03 3.326+05 1.796+03 3.314+05
1.801+03 3.420+05 1.803+03 3.709+05 1.804+03 3.652+05 1.805+03 3.671+05
1.806+03 3.644+05 1.807+03 3.601+05 1.808+03 3.682+05 1.809+03 3.659+05
1.810+03 3.682+05 1.811+03 3.771+05 1.812+03 3.615+05 1.813+03 3.728+05
1.814+03 3.689+05 1.815+03 3.789+05 1.816+03 3.815+05 1.817+03 3.843+05
1.818+03 3.973+05 1.819+03 4.103+05 1.820+03 4.270+05 1.821+03 4.363+05
1.822+03 4.371+05 1.823+03 4.668+05 1.824+03 4.716+05 1.825+03 4.789+05
1.826+03 4.859+05 1.827+03 4.937+05 1.828+03 5.088+05 1.829+03 5.192+05
1.830+03 5.212+05 1.831+03 5.381+05 1.832+03 5.435+05 1.833+03 5.554+05
1.834+03 5.719+05 1.835+03 5.846+05 1.836+03 5.911+05 1.837+03 5.984+05
1.838+03 6.058+05 1.839+03 6.200+05 1.840+03 6.280+05 1.841+03 6.344+05
1.842+03 6.746+05 1.843+03 6.967+05 1.844+03 7.198+05 1.845+03 7.423+05
1.846+03 7.428+05 1.847+03 7.468+05 1.848+03 7.551+05 1.849+03 7.462+05
1.850+03 7.466+05 1.851+03 7.466+05 1.852+03 7.432+05 1.853+03 7.445+05
1.854+03 7.586+05 1.855+03 7.747+05 1.856+03 7.862+05 1.857+03 7.887+05
1.858+03 8.004+05 1.859+03 8.066+05 1.860+03 8.027+05 1.861+03 8.097+05
1.862+03 8.024+05 1.863+03 7.957+05 1.864+03 8.053+05 1.865+03 7.880+05
1.866+03 7.903+05 1.867+03 7.867+05 1.868+03 7.915+05 1.869+03 7.742+05
1.870+03 7.852+05 1.871+03 7.891+05 1.872+03 7.877+05 1.873+03 8.009+05
1.874+03 8.030+05 1.875+03 7.966+05 1.876+03 8.050+05 1.877+03 8.013+05

1.878+03 8.198+05 1.879+03 8.234+05 1.880+03 8.313+05 1.881+03 8.506+05
1.882+03 8.468+05 1.883+03 8.546+05 1.884+03 8.553+05 1.885+03 8.670+05
1.886+03 8.710+05 1.887+03 8.812+05 1.888+03 8.796+05 1.889+03 8.891+05
1.890+03 8.808+05 1.891+03 8.930+05 1.892+03 8.893+05 1.893+03 8.989+05
1.894+03 9.150+05 1.895+03 9.220+05 1.896+03 9.339+05 1.897+03 9.584+05
1.898+03 9.666+05 1.899+03 9.740+05 1.900+03 9.868+05 1.901+03 9.923+05
1.902+03 1.011+06 1.903+03 1.031+06 1.904+03 1.045+06 1.905+03 1.067+06
1.906+03 1.069+06 1.907+03 1.078+06 1.908+03 1.065+06 1.909+03 1.075+06
1.910+03 1.076+06 1.911+03 1.077+06 1.912+03 1.089+06 1.913+03 1.082+06
1.914+03 1.079+06 1.915+03 1.092+06 1.916+03 1.088+06 1.917+03 1.099+06
1.918+03 1.102+06 1.919+03 1.110+06 1.920+03 1.122+06 1.921+03 1.126+06
1.922+03 1.126+06 1.923+03 1.118+06 1.924+03 1.116+06 1.925+03 1.101+06
1.926+03 1.101+06 1.927+03 1.108+06 1.928+03 1.102+06 1.929+03 1.098+06
1.930+03 1.087+06 1.931+03 1.082+06 1.932+03 1.091+06 1.933+03 1.090+06
1.934+03 1.086+06 1.935+03 1.083+06 1.936+03 1.089+06 1.937+03 1.093+06
1.938+03 1.093+06 1.939+03 1.090+06 1.940+03 1.097+06 1.941+03 1.097+06
1.942+03 1.096+06 1.943+03 1.087+06 1.944+03 1.091+06 1.945+03 1.093+06
1.946+03 1.093+06 1.947+03 1.092+06 1.948+03 1.087+06 1.949+03 1.096+06
1.950+03 1.096+06 1.951+03 1.085+06 1.952+03 1.093+06 1.953+03 1.105+06
1.954+03 1.101+06 1.955+03 1.119+06 1.956+03 1.116+06 1.957+03 1.118+06
1.958+03 1.144+06 1.959+03 1.135+06 1.960+03 1.150+06 1.961+03 1.147+06
1.962+03 1.151+06 1.963+03 1.159+06 1.964+03 1.159+06 1.965+03 1.160+06
1.966+03 1.171+06 1.967+03 1.158+06 1.968+03 1.157+06 1.969+03 1.157+06
1.970+03 1.160+06 1.971+03 1.151+06 1.972+03 1.150+06 1.973+03 1.166+06
1.974+03 1.150+06 1.975+03 1.157+06 1.976+03 1.148+06 1.977+03 1.144+06
1.978+03 1.147+06 1.979+03 1.144+06 1.980+03 1.141+06 1.981+03 1.149+06
1.982+03 1.142+06 1.983+03 1.143+06 1.984+03 1.148+06 1.985+03 1.138+06
1.986+03 1.142+06 1.987+03 1.136+06 1.988+03 1.143+06 1.989+03 1.137+06
1.990+03 1.130+06 1.991+03 1.123+06 1.992+03 1.120+06 1.993+03 1.119+06
1.994+03 1.108+06 1.995+03 1.111+06 1.996+03 1.107+06 1.997+03 1.140+06
1.998+03 1.099+06 1.999+03 1.087+06 2.000+03 1.086+06 2.001+03 1.089+06
2.002+03 1.079+06 2.003+03 1.082+06 2.004+03 1.084+06 2.005+03 1.080+06
2.006+03 1.078+06 2.006+03 1.092+06 2.007+03 1.074+06 2.008+03 1.072+06
2.009+03 1.083+06 2.010+03 1.085+06 2.011+03 1.076+06 2.011+03 1.092+06
2.012+03 1.096+06 2.013+03 1.086+06 2.014+03 1.112+06 2.015+03 1.107+06
2.016+03 1.094+06 2.016+03 1.125+06 2.017+03 1.133+06 2.018+03 1.119+06
2.019+03 1.148+06 2.020+03 1.137+06 2.021+03 1.126+06 2.021+03 1.150+06
2.022+03 1.149+06 2.023+03 1.148+06 2.024+03 1.153+06 2.025+03 1.143+06
2.026+03 1.152+06 2.026+03 1.146+06 2.027+03 1.133+06 2.028+03 1.139+06
2.029+03 1.138+06 2.030+03 1.130+06 2.031+03 1.144+06 2.031+03 1.125+06
2.032+03 1.119+06 2.033+03 1.118+06 2.034+03 1.116+06 2.035+03 1.107+06
2.036+03 1.125+06 2.036+03 1.107+06 2.037+03 1.108+06 2.038+03 1.111+06
2.039+03 1.105+06 2.040+03 1.096+06 2.040+03 1.110+06 2.041+03 1.098+06
2.042+03 1.102+06 2.043+03 1.097+06 2.044+03 1.094+06 2.045+03 1.104+06

2.046+03 1.103+06 2.046+03 1.091+06 2.047+03 1.090+06 2.048+03 1.100+06
2.049+03 1.089+06 2.050+03 1.092+06 2.051+03 1.092+06 2.051+03 1.085+06
2.052+03 1.094+06 2.053+03 1.084+06 2.054+03 1.085+06 2.055+03 1.078+06
2.056+03 1.079+06 2.056+03 1.070+06 2.057+03 1.080+06 2.058+03 1.079+06
2.059+03 1.078+06 2.060+03 1.071+06 2.061+03 1.069+06 2.061+03 1.072+06
2.062+03 1.063+06 2.063+03 1.060+06 2.064+03 1.061+06 2.065+03 1.062+06
2.066+03 1.062+06 2.066+03 1.060+06 2.067+03 1.053+06 2.068+03 1.051+06
2.069+03 1.044+06 2.070+03 1.042+06 2.071+03 1.045+06 2.071+03 1.043+06
2.072+03 1.043+06 2.073+03 1.046+06 2.074+03 1.047+06 2.075+03 1.060+06
2.076+03 1.030+06 2.076+03 1.058+06 2.077+03 1.057+06 2.078+03 1.053+06
2.079+03 1.068+06 2.080+03 1.072+06 2.081+03 1.056+06 2.081+03 1.080+06
2.082+03 1.084+06 2.083+03 1.082+06 2.084+03 1.081+06 2.085+03 1.083+06
2.086+03 1.067+06 2.086+03 1.076+06 2.087+03 1.082+06 2.088+03 1.079+06
2.089+03 1.079+06 2.090+03 1.079+06 2.091+03 1.077+06 2.091+03 1.080+06
2.092+03 1.070+06 2.093+03 1.072+06 2.094+03 1.064+06 2.095+03 1.068+06
2.096+03 1.070+06 2.096+03 1.069+06 2.097+03 1.067+06 2.098+03 1.069+96
2.099+03 1.076+06 2.100+03 1.066+06 2.101+03 1.066+06 2.101+03 1.076+06
2.102+03 1.063+06 2.103+03 1.070+06 2.104+03 1.064+06 2.105+03 1.053+06
2.106+03 1.059+06 2.106+03 1.060+06 2.107+03 1.062+06 2.108+03 1.045+06
2.109+03 1.039+06 2.110+03 1.039+06 2.111+03 1.050+06 2.111+03 1.039+06
2.112+03 1.030+06 2.113+03 1.040+06 2.114+03 1.032+06 2.115+03 1.020+06
2.116+03 1.037+06 2.116+03 1.026+06 2.117+03 1.029+06 2.118+03 1.032+06
2.119+03 1.023+06 2.120+03 1.017+06 2.121+03 1.030+06 2.121+03 1.017+06
2.122+03 1.018+06 2.123+03 1.020+06 2.124+03 1.016+06 2.125+03 1.005+06
2.126+03 1.024+06 2.126+03 1.012+06 2.127+03 1.011+06 2.128+03 1.012+06
2.129+03 1.011+06 2.130+03 1.008+06 2.131+03 1.020+06 2.131+03 1.006+06
2.132+03 1.004+06 2.133+03 1.002+06 2.134+03 9.975+05 2.135+03 1.002+06
2.136+03 1.006+06 2.136+03 9.951+05 2.137+03 1.003+06 2.138+03 9.990+05
2.139+03 9.826+05 2.140+03 9.837+05 2.141+03 1.009+06 2.141+03 9.894+05
2.142+03 9.911+05 2.143+03 1.000+06 2.144+03 9.878+05 2.145+03 9.968+05
2.146+03 1.003+06 2.146+03 9.831+05 2.147+03 9.913+05 2.148+03 9.991+05
2.149+03 9.887+05 2.150+03 9.936+05 2.151+03 1.003+06 2.151+03 9.866+05
2.152+03 9.924+05 2.153+03 1.003+06 2.156+03 1.010+06 2.158+03 1.006+06
2.161+03 1.013+06 2.163+03 1.014+06 2.166+03 1.008+06 2.168+03 1.012+06
2.171+03 1.004+06 2.173+03 1.001+06 2.176+03 1.005+06 2.178+03 1.007+06
2.181+03 9.964+05 2.183+03 9.892+05 2.186+03 9.787+05 2.188+03 9.785+05
2.191+03 9.759+05 2.193+03 9.710+05 2.196+03 9.609+05 2.198+03 9.582+05
2.201+03 9.708+05 2.203+03 9.585+05 2.206+03 9.602+05 2.208+03 9.521+05
2.211+03 9.574+05 2.213+03 9.512+05 2.216+03 9.614+05 2.218+03 9.568+05
2.221+03 9.580+05 2.223+03 9.487+05 2.226+03 9.402+05 2.228+03 9.509+05
2.231+03 9.498+05 2.233+03 9.387+05 2.236+03 9.488+05 2.238+03 9.441+05
2.241+03 9.417+05 2.243+03 9.439+05 2.246+03 9.459+05 2.248+03 9.389+05
2.251+03 9.322+05 2.253+03 9.429+05 2.256+03 9.349+05 2.258+05 9.367+05
2.261+03 9.378+05 2.263+03 9.394+05 2.266+03 9.408+05 2.268+03 9.484+05

2.271+03 9.557+05 2.273+03 9.729+05 2.276+03 1.012+06 2.278+03 1.072+06
2.281+03 1.118+06 2.283+03 1.151+06 2.286+03 1.137+06 2.288+03 1.105+06
2.291+03 1.076+06 2.293+03 1.068+06 2.296+03 1.057+06 2.298+03 1.041+06
2.301+03 1.032+06 2.303+03 1.020+06 2.306+03 1.024+06 2.308+03 1.084+06
2.311+03 1.012+06 2.313+03 1.013+06 2.316+03 1.008+06 2.318+03 1.014+06
2.321+03 9.960+05 2.323+03 1.005+06 2.326+03 9.932+05 2.328+03 9.890+05
2.331+03 9.921+05 2.333+03 9.954+05 2.334+03 9.968+05 2.338+03 9.862+05
2.341+03 9.971+05 2.343+03 9.926+05 2.346+03 9.882+05 2.348+03 9.767+05
2.351+03 9.887+05 2.353+03 9.878+05

Z = 74, W eV, barns per atom pairs 5 pts ref = 003Te01
5.110+05 3.614+01 6.620+05 3.060+01 1.170+06 1.804+01 1.280+06 1.675+01
1.330+06 1.580+01

Z = 78, Pt eV, barns per atom pairs 2 pts ref = 001An01
1.337+04 5.310+03 1.497+04 4.020+03

Z = 79, Au eV, barns per atom pairs 4 pts ref = 001An01
1.337+04 4.000+04 1.497+04 4.720+04 2.210+04 1.980+04 2.499+04 1.450+04

Z = 79, Au eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 3.481+03 5.950+04 1.465+03

Z = 79, Au eV, barns per atom pairs 1 pt ref = 003Ku01
8.099+04 i.735+03

Z = 82, Pb eV, barns per atom pairs 4 pts ref = 001An01
1.337+04 5.200+04 1.497+04 3.800+04 1.744+04 4.550+04 1.963+04 3.234+04

Z = 82, Pb eV, barns per atom pairs 240 pts ref = 78Gi01
9.620+06 1.704+01 9.880+06 2.149+01 1.013+07 1.735+01 1.037+07 1.746+01
1.061+07 1.762+01 1.087+07 1.781+01 1.112+07 1.794+01 1.135+07 1.815+01
1.159+07 1.832+01 1.186+07 1.838+01 1.210+07 1.856+01 1.235+07 1.873+01
1.260+07 1.887+01 1.286+07 1.903+01 1.311+07 1.918+01 1.337+07 1.940+01
1.362+07 1.956+01 1.386+07 1.965+01 1.413+07 1.976+01 1.440+07 1.983+01
1.464+07 1.987+01 1.488+07 1.993+01 1.512+07 1.997+01 1.537+07 2.003+01
1.561+07 2.009+01 1.585+07 2.012+01 1.611+07 2.022+01 1.636+07 2.024+01
1.662+07 2.037+01 1.688+07 2.045+01 1.712+07 2.058+01 1.736+07 2.058+01
1.761+07 2.068+01 1.788+07 2.078+01 1.814+07 2.085+01 1.839+07 2.092+01
1.863+07 2.109+01 1.887+07 2.111+01 1.912+07 2.121+01 1.937+07 2.123+01
1.962+07 2.137+01 1.988+07 2.145+01 2.013+07 2.148+01 2.038+07 2.155+01
2.062+07 2.164+01 2.087+07 2.168+01 2.113+07 2.176+01 2.136+07 2.195+01
2.160+07 2.192+01 2.182+07 2.203+01 2.206+07 2.211+01 2.229+07 2.218+01
2.256+07 2.226+01 2.283+07 2.233+01 2.310+07 2.243+01 2.337+07 2.247+01

2.364+07 2.257+01 2.390+07 2.269+01 2.413+07 2.274+01 2.438+07 2.282+01
2.463+07 2.295+01 2.485+07 2.294+01 2.513+07 2.301+01 2.536+07 2.310+01
2.562+07 2.316+01 2.580+07 2.322+01 2.608+07 2.335+01 2.631+07 2.347+01
2.657+07 2.340+01 2.682+07 2.342+01 2.708+07 2.360+01 2.735+07 2.366+01
2.759+07 2.374+01 2.786+07 2.369+01 2.810+07 2.380+01 2.837+07 2.390+01
2.861+07 2.402+01 2.888+07 2.406+01 2.910+07 2.403+01 2.937+07 2.419+01
2.961+07 2.424+01 2.989+07 2.425+01 3.080+07 2.448+01 3.126+07 2.458+01
3.177+07 2.472+01 3.227+01 2.483+01 3.277+07 2.491+01 3.324+07 2.504+01
3.374+07 2.519+01 3.426+07 2.518+01 3.478+07 2.535+01 3.528+07 2.538+01
3.577+07 2.547+01 3.627+07 2.570+01 3.672+01 2.573+01 3.721+07 2.577+01
3.772+07 2.588+01 3.823+07 2.592+01 3.873+07 2.606+01 3.923+07 2.617+01
3.975+07 2.623+01 4.021+07 2.630+01 4.070+07 2.639+01 4.119+07 2.657+01
4.176+07 2.659+01 4.223+07 2.661+01 4.276+07 2.681+01 4.326+07 2.682+01
4.378+07 2.699+01 4.424+07 2.691+01 4.482+07 2.704+01 4.533+07 2.716+01
4.584+07 2.724+01 4.636+07 2.721+01 4.683+07 2.740+01 4.730+07 2.742+01
4.781+07 2.744+01 4.829+07 2.756+01 4.877+07 2.761+01 4.933+07 2.774+01
4.981+07 2.764+01 5.033+07 2.776+01 5.081+07 2.799+01 5.136+07 2.809+01
5.183+07 2.810+01 5.235+07 2.807+01 5.282+07 2.825+01 5.338+07 2.827+01
5.386+07 2.843+01 5.440+07 2.845+01 5.485+07 2.847+01 5.526+07 2.865+01
5.574+07 2.857+01 5.616+07 2.854+01 5.665+07 2.870+01 5.706+07 2.869+01
5.757+07 2.873+01 5.813+07 2.869+01 5.865+07 2.900+01 5.923+07 2.896+01
5.970+07 2.903+01 6.026+07 2.901+01 6.067+07 2.923+01 6.121+07 2.922+01
6.171+07 2.919+01 6.227+07 2.932+01 6.279+07 2.935+01 6.328+07 2.940+01
6.381+07 2.955+01 6.427+07 2.949+01 6.467+07 2.969+01 6.523+07 2.946+01
6.573+07 2.967+01 6.620+07 2.964+01 6.674+07 2.979+01 6.726+07 2.974+01
6.779+07 2.999+01 6.818+07 2.981+01 6.876+07 3.011+01 6.930+07 3.011+01
6.980+07 2.993+01 7.020+07 3.003+01 7.079+07 2.999+01 7.127+07 3.015+01
7.174+07 3.013+01 7.215+07 3.036+01 7.279+07 3.040+01 7.335+07 3.031+01
7.374+07 3.049+01 7.422+07 3.049+01 7.479+07 3.050+01 7.551+07 3.042+01
7.663+07 3.051+01 7.765+07 3.081+01 7.854+07 3.064+01 7.949+07 3.084+01
8.050+07 3.098+01 8.154+07 3.082+01 8.257+07 3.108+01 8.353+07 3.111+01
8.451+07 3.117+01 8.556+07 3.137+01 8.656+07 3.135+01 8.749+07 3.124+01
8.848+07 3.145+01 8.947+07 3.148+01 9.051+07 3.151+01 9.150+07 3.163+01
9.245+07 3.177+01 9.348+07 3.188+01 9.454+07 3.178+01 9.551+07 3.181+01
9.649+07 3.187+01 9.751+07 3.198+01 9.842+07 3.203+01 9.940+07 3.206+01
1.004+08 3.215+01 1.014+08 3.227+01 1.024+08 3.233+01 1.035+08 3.229+01
1.044+08 3.245+01 1.055+08 3.254+01 1.065+08 3.269+01 1.075+08 3.248+01
1.086+08 3.260+01 1.097+08 3.255+01 1.107+08 3.287+01 1.117+08 3.280+01
1.128+08 3.293+01 1.136+08 3.299+01 1.145+08 3.294+01 1.155+08 3.302+01
1.163+08 3.287+01 1.174+08 3.305+01 1.183+08 3.300+01 1.192+08 3.310+01
1.204+08 3.316+01 1.215+08 3.318+01 1.225+08 3.351+01 1.234+08 3.324+01
1.246+08 3.338+01 1.260+08 3.333+01 1.280+08 3.347+01 1.302+08 3.360+01
1.319+08 3.362+01 1.340+08 3.384+01 1.361+08 3.372+01 1.379+08 3.385+01
1.399+08 3.397+01 1.421+08 3.404+01 1.441+08 3.415+01 1.458+08 3.422+01

1.479+08 3.416+01 1.500+08 3.429+01 1.519+08 3.431+01 1.540+08 3.430+01
1.562+08 3.437+01 1.576+08 3.451+01 1.598+08 3.439+01 1.619+08 3.463+01

Z = 92, U eV, barns per atom pairs 2 pts ref = 97Ro01
4.300+04 6.169+03 5.950+04 2.536+03

Z = 92, U eV, barns per atom pairs 1 pt ref = 96Bi01
1.634+05 8.005+02

Table 2. Summary of Photon Cross Section Data Extracted (23 Papers).

Z, Symbol	Number of papers with data	Data points
5 B	1	5
6 C	3	74
7 N	1	77
8 O	2	131
10 Ne	1	103
13 Al	4	334
14 Si	3	631
16 S	1	2
20 Ca	2	7
22 Ti	1	4
23 V	3	17
25 Mn	2	10
26 Fe	2	10
27 Co	2	10
28 Ni	1	8
29 Cu	6	183
30 Zn	2	12
32 Ge	1	6
34 Se	1	5
36 Kr	1	40
40 Zr	3	35
41 Nb	3	21
42 Mo	5	19
45 Rh	2	14
46 Pd	1	3
47 Ag	2	18
48 Cd	4	17
49 In	3	12
50 Sn	2	142
54 Xe	1	110

57 La	1	13
58 Ce	2	13
59 Pr	2	13
60 Nd	2	13
62 Sm	1	11
63 Eu	1	1
64 Gd	4	14
65 Tb	2	2
66 Dy	4	14
67 Ho	2	12
68 Er	4	14
70 Yb	1	2
73 Ta	5	426
74 W	2	507
78 Pt	1	2
79 Au	3	7
82 Pb	2	244
92 U	2	3

48 Elements Total Data Points Extracted: 3357